# THEMESCAPE QURANIC VISUALIZATION

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# Abstract

Themescape Quranic Visualization is a system that helps user to increase the understanding in reading and viewing the content of Al-Quran using the themescape visualization. This is a stand-alone system that requires operating system Widows 98 or above. This report especially focuses on to find ways to improve viewing, accessing or retrieving the content of Al Quran effectively. User can identify and differentiate the difference between Makkiyah and Madaniyah ayahs in Al-Quran. Besides, user can zoom in and out of ayah Al Quran for better navigation.

The problem that emerged among users while reciting Al Quran such as lack of understanding the content and the meaning of Al Quran, and also problem among Quran researchers themselves has made this Themescape Quranic Visualization very useful and easy to learn to overcome all those problems.

The system provides lot of information and knowledge for user to know more about Al Quran. It can be accessed anywhere at anytime and suitable for all type of users especially Muslims.

## Acknowledgement

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# CHAPTER 1

## 1.1 Project Overview

Nowadays, the technology development in Muslim organization in the subject that must be highlighted. Information technology is the one of the main area that must be explored by Muslims.

There are so many visualization techniques to represent data to make it easy to search and navigate. Although there are so many type of visualization, such as visualizing the football result, financial marketing etc, but none of them visualize the Al Quran ayahs. There is no initiative to visualize the Holy Quran whether among Muslims themselves or non-Muslim. Therefore, this system will mainly focus on visualizing the Al Quran ayah using themescape concept.

The computer information visualization has revolutionized the way we interact with and understand data. Beyond its most obvious issues aspects of display behavior, engineering analysis visualizations involves such as interaction with a 3-Dimension model, operations on result data and optimization of design variables.

Multimedia is one of the latest information technologies that must be exploited by all Muslims. Many Islamic packages and applications such as Quran Viewer 2.72 and Quran Reciter 2.0 that contains the latest version of the multi-lingual Quran viewer software. Based on that, the Muslim community must take the opportunity of the growth of technology to develop and improve their knowledge at the world stage.

## 1.2 Problem Statement

The research and development of a software system for a Muslim is fundamental because of many reasons. One of the reasons is to develop a truly knowledgeable and critical thinking from the perspective of Islam. The problem that always occurred among Muslims during reciting Al Quran is [9]:

- Lack of understanding the content of the Al Quran:

  Muslims has been given Al Quran as the guidance to warship Allah. Muslims are rewarded when reading Al Quran. Besides, more rewards will be given if people practice the contents of Al Quran. However the current Muslims societies do not really understand the meaning and messages in Al Quran because the lack of knowledge in Arabic language. This weakness is because the lack of interest of understanding the content of Al Quran.

- Problem that emerge within Quran researchers:

  This kind of problem can be divided into three main scopes: reader (user), presenter and source. Below are the explanations of the problem:

  a) Reader (user):

  Reader is the person who read the Quran. They are Muslims some of them are non-Mulims. Therefore the problem that might occur among them is to understand the Arabic language because Quran is written in

Arabic. Besides, they also have problem with time consuming. Most of them do not have time to study the Quran such as in the field of *Tahfiz* and *Tajwid*. They have limited time because of daily work and their other activities.

b) Presenter:

Presenter of Quran can be among teachers, lecturers and preachers. Some of them are also non-Muslims. The same problem is to understand the source that is written in Arabic language. If the source has been translated into their own language such as Malay or English, they cannot understand it extremely 100%. This because the source that has been translated is not based on the real meaning of what that is written in Quran in Arabic language. It is hard to translate from Arabic to English because the meaning is not the same and based on the translator perception. Besides, the sincerity among the presenter is very important. It is believed that a good presenter is the person who can accept others opinion sincerely. But nowadays, most of the presenter cannot accept others opinion where they believed that their perception is correct and precise.

c) Sources:

As we all know, Arabic is a classic language because it is the earliest language that exist in this world. Therefore, the source is quite old and it is hard to get the real source. It needs help to really understand the

source where a person must have other knowledge to make sure that they can understand it well.

All this issues must be solved as best and as fast as possible so that it will produce and environment that is able to encourage the Muslims to get closer to Al Quran and automatically to understand its contents well.

## .3 Project Objectives

The aim for this project is to apply existing visualization techniques to retrieve, ıccess and view all ayahs or sentences in Al-Quran. The objectives I aim to achieve for his specific module are as following:

- To find a suitable algorithm that can be used to visualize Al Quran
- To increase the understanding in reading and viewing the content of Al-Quran using the themescape visualization.
- To discover appropriate function in relation to themescape.

## 1.4 Project Scope

This system makes use of the existing visualization techniques to find ways to improve viewing, accessing or retrieving the content of Al Quran effectively. Themescape is another method for information visualization. Therefore, the scopes that this system will cover are:

- Focusing and searching of each and every single ayah of Makiyyah and Madaniah in Al Quran.
- To make it available for zooming in and out of ayah Al Quran for better navigation for users.
- Employing specific algorithm for themescape.
- Using multidimensional icon where possible

## 1.5 Methodology of System Development

As for the methodology of the system development, I have chose Spiral model approach since this approach can produce the system that is easier to evolve, flexible, robust and reusable.

Spiral model phases are Requirement Analysis, Design, Implementation, and Testing. The output of the Requirement Analysis phase is a set of requirement such as functional, non-functional, system and user requirement. In the Design phase the requirements are examined. In addition, the project system design also includes transforming the requirements into a representation that can be assessed for quality. In the Implementation phase, the system design that has been defined in previous phase will be implemented on the system. In the Testing phase, several testing will be conducted such as code testing, unit testing, integration testing and acceptance testing.

The detail about the methodology of the system will be discussed briefly in Chapter 3.

## 1.6 Project Development Planning

Project scheduling is done to manage time and tasks systematically. It is also done to avoid late delivery. The following Gantt chart represents schedule for this project:

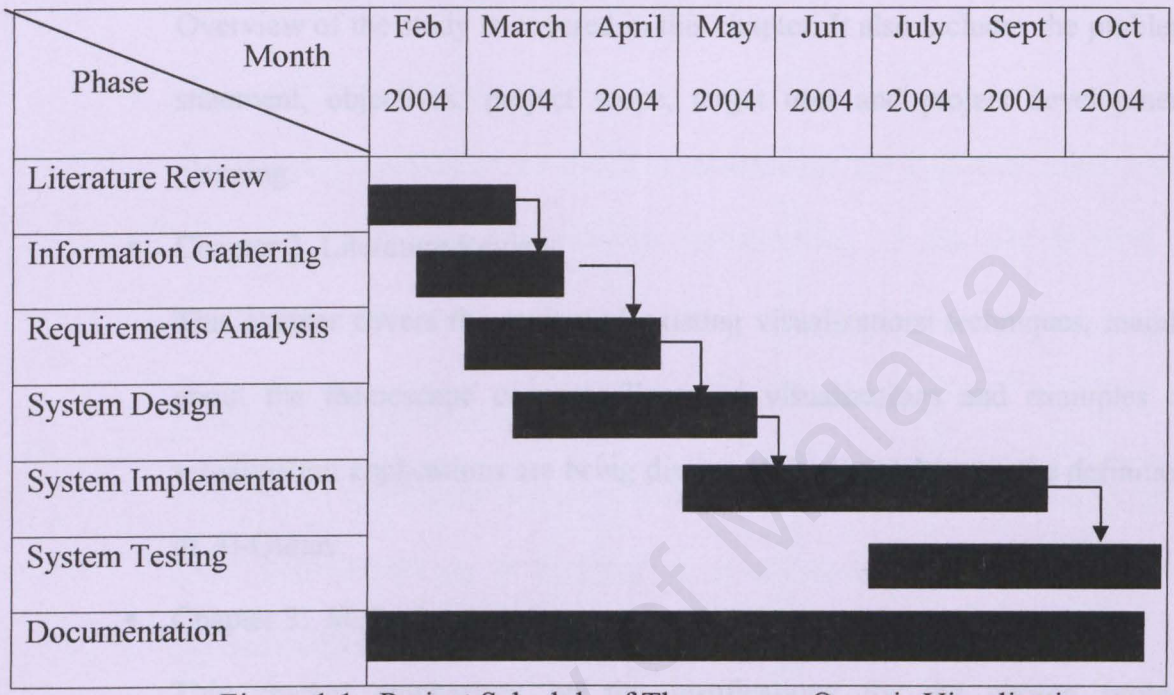



Figure 1.1 : Project Schedule of Themescape Quranic Visualization

## 1.7 Project Planning Draft

This section summarizes the layout of the project planning draft:

- Chapter 1: Introduction

  Overview of the study is covered in this chapter. It also includes the problem statement, objectives, project scope, target user and project development planning.

- Chapter 2: Literature Review

  This chapter covers the review of existing visualizations techniques, mainly about the themescape concept. Types of visualizations and examples of visualization applications are being discussed. It also elaborates the definition of Al-Quran.

- Chapter 3: Methodology

  This chapter emphasizes on the justifications for the chosen project methodology. It also discusses the information gathering techniques and the explanation about the development software and platform chosen to develop this system.

- Chapter 4: System Analysis

  This chapter describes the system analysis of the project including functional requirements, non-functional requirements, hardware and software requirements on different developing tools. It also explains how the requirements for this project were acquired.

- Chapter 5: System Design

  This chapter explains the conceptual and technical design of the system. It covers the structure chart, data flow diagram, process flowchart, user interface and database design.

- Chapter 6: System Implementation

  This chapter consists of the detail explanation of the implementation phase and the coding process involves transforming of the design into a programming language.

- Chapter 7: System Testing

  This chapter will discuss about the testing phase. This is also a very important stage whereby testing is essential to assure quality of the system. The objective of testing is to find system error and fault.

## 1.8 Summary

This chapter focuses mainly on the introduction of this project. A brief introduction and definition are stated in the first part of this chapter, which is the Project Overview. Apart from that, relevant information and topics are also being discussed consequentially. Topics included are Problems Statements, Project Objectives, Project Scope, Methodology of System Development, Project Development Planning and Organization of Thesis. The research and development of this proposed system will take about 8 months.

The next chapter literature review will carried out whereby current systems are surveyed to better understand how it is implemented, together with comparisons between different operating system platforms, development tools, databases and others.

# CHAPTER 2

## 2.1 Al Quran

### 2.1.1 Introduction of Al Quran

Al Quran [3] is messages from Allah to humanity. The word 'Quran' means reading or recitations. It was revealed to us in a chain from Allah SWT to the prophet Muhammad SAW through angel Gabrial. There are more than 6000 ayahs that are categorized into 114 chapters or surah of varying size, which are arranged roughly according to their order of length and finally divided into 30 juz'. The al-Quran started off with the surah of al-Fatihah and closed with an-Nas.

The Quran is a magnificent document that has been known for fourteen centuries because of its matchlessness or inimitability. Its paragraphs and sections have a very traditional order that is easily followed and by which the verses can be located. The present order in the Quran was achieved two or three decades after the Prophet's death, or about the year 650 A.D. The third caliph Uthman ibnAffan appointed a committee to achieve an authorized version of the Quranic text. Uthman's committee was set up to publish the Quran in a standard version, and the members naturally showed great conscientiousness in this respect. This committee fulfilled its task well, and so within a score of years after the Prophet's death, a splendid job was accomplished.

### 2.1.2 Context of Makkiyah and Madaniah ayahs

In general, Makkiyah and Madaniah [3] is a knowledge that tells about ayahs and surahs that has been sent to people in Mecca and Madinah and it's

surrounding. In more specific, Islamic ulama have different opinions of concept and in formative Madaniah or Makkiyah ayahs. Thus, ulama have divided ayahs into three different perceptions:

- Perception of time
- Perception of venue
- Perception of aimed community

But the only perception that has the consensus by most ulama (*jumhur ulama*) is the perception of time. It is concluded that surahs and ayahs that has been sent to all humanity before Hijrah are Makkiyah ayahs, and those surahs and ayahs that has been sent to all humanity after Hijrah are Madaniah ayahs. The definition of the time before Hijrah prolonged for 12 years, 5 months and 13 days. Starting on the 17th of Ramadhan, when Prophet Muhammad was 41 years old, until early Rabiul Awal when he was 54 years old. All ayahs that were falled under with that time frame are Makkiyah ayahs that wrap almost 19 Juz in the al-Quran. And the definition of the time after Hijrah prolonged for 9 years 9 months and 9 days. Starting from early Rabiul Awal until the 9$^{th}$ of Zulhijjah when Prophet Muhammad was 63 years old. . All ayahs that were falled under with that time frame are Madaniah ayahs that wrap almost the remaining 11 Juz in the al-Quran.

## 2.2 Introduction to Visualization

Visualization provides an interface between two powerful information-processing systems; the human mind and the modern computer. Visualization is the process of transforming data, information, and knowledge into visual form making use of humans' natural visual capabilities. With effective visual interfaces we can interact with large volumes of data rapidly and effectively to discover hidden characteristics, patterns, and trends. In our increasingly information-rich society, research and development in visualization has fundamentally changed the way we present and understand large complex data sets. The widespread and fundamental impact of visualization has led to new insights and more efficient decision-making [1].

Much of the previous research in visualization was driven by the scientific community in its efforts to cope with the huge volumes of scientific data being collected by scientific instruments or generated by enormous supercomputer simulations. Recently a new trend has emerged: The explosive growth of the Internet, the overall computerization of the business and defense sectors, and the deployment of data warehouses have created a widespread need and an emerging appreciation that visualization techniques are an essential tool for the broad business and technical communities.

Information visualization deals with new classes of data and their associated analytical tasks in business and information technology areas. Information visualization combines aspects of scientific visualization, human–computer interfaces, data mining, imaging, and graphics. In contrast to most scientific data, information visualization

focuses on information, which is often abstract. In many cases information is not automatically mapped to the physical world (e.g., geographical space). This fundamental difference means that many interesting classes of information have no natural and obvious physical representation. A key research problem is to discover new visual metaphors for representing information and to understand what analytical tasks they support. Information can come in huge quantities and in fast streams, creating an information avalanche. The largest information space is perhaps the World Wide Web (WWW), which contains millions of pages. Information visualization needs to enable users (e.g., in the commercial and the defense sectors) to get information fast, make sense out of it, and reach decisions in a relatively short time.

### 2.2.1 Why visualize

The importance of information visualization is its potential to solve real-world problems far beyond a purely academic interest. It is exciting to note that this relatively new discipline has already penetrated the commercial market. Some examples of commercial application include [1]:

- Solving problems in the financial market.
- Using applications of ideas developed at Xerox PARC (e.g., Perspective Wall, Cone Tree, Wide Widgets) to forge the next generation of user interface that will be more visual than current ones.
- Using information visualization to represent knowledge extracted from large data bases using data mining to provide decision support in commercial and other environments.

### 2.2.2 Techniques of Information Visualization Applied

**Data Type:**

a) **2-D Map Data**

Planer or map data include geographic maps, floorplans, and newspaper layouts. Each item in the collection covers some part of the total area and may not be rectangular. Each item has task-domain attributes, such as name, owner and value, and interface-domain features, such as size, color, and opacity. Many systems adopt a multiple-layer approach to dealing with map data, but each layer is two-dimensional. User tasks are to find adjacent items, containing items, and to perform the seven basic tasks.

Examples include geographic-information systems, which are a large research and commercial domain with numerous systems available. Information-visualization researches have used spatial displaysto document collections (Color Plate B2) organized proximally by term co-occurences.

**Task:**

a) **Overview Task**

We can gain an overview of the entire collection. Overview strategies include zoomed-out views of each data type that allow the user to see the entire collection plus an adjoining detail view. The overview contains a movable field-of-view box with which the user controls the content of the detail view, allowing zoom factors 3 to 30. Replication of this strategy with intermediate views enables users to reach larger zoom factors.

Although query-language facilities made it difficult to gain an overview of a collection, information-visualization interfaces support some overview strategy- or should do so. Adequate overview strategies are a useful criterion to judge such interfaces.

**b) Zoom Task**

We can zoom in on items of interest. Users typically have an interest in some portion of a collection, and they need tools to enable them to control the zoom focus and the zoom factor. Smooth zooming helps users to preserve their sense of position and context. A user can zoom on one dimension at a time by moving the zoom bar controls or by adjusting the size of the field-of-view box. A satisfying way to zoom in is to point to a location and to issue a zooming command, usually by holding down a mouse button.

**c) Details-on-Demand Task**

We can select an item or group to get details. Once a collection has been trimmed to a few dozen items, it should be easy to browse the details about the group or individual items. The usual approach is to simply click on an item to get a pop-up window with values of each of the attributes.

**d) Extract Task**

We can allow extraction of sub collections and of the query parameters. Once users have obtained the item or set of items that they desire, it would be useful for them to be able to extract that set and to save it to a file in a format that would facilitate other uses, such as sending by electronic mail, printing, graphing or insertion into a statistical or presentation package

**Other Visualization Techniques**

**Data:**

**i) 3-D World**

Real-world objects such as molecules and the human body have items with volume and with potentially complex relationships with other items. Computer-assisted design systems are built to handle complex three-dimensional relationships. In three-dimensional applications, users must cope with their position and orientation when viewing the objects, plus must handle the serious problems of *occlusion.*

**ii) Temporal Data**

Temporal data are the items that have a start and finish time, and that items may overlap. Temporal-data visualizations appear in systems for editing video data, composing music, or preparing animations such as Macromedia Director.

### iii) Multidimensional Data

Most relational and statistical database contents are conveniently controlled as a multidimensional data, in which items with N attributes become points in a n-dimensional space.

Multi-dimensional data can be symbolized by 3-dimensional scattergram, disorientation and occlusion can be problems. The technique of using parallel coordinates is a clever innovation that makes certain tasks easier, but takes practice for users to understand.

Interface representations can be signified as a 2-dimensional scattergram, for attribute values with small cardinality.

### iv) Tree

Tree structures are set of items, in which each item (except the root) has a link to one parent item. Items and the links between parents and child can have multiple attributes.

The basic tasks can be practical to items and links to make task related to structural properties attractive. It is likely to have similar items at leaves and internal nodes. It is also common to find different items at each level in a tree. It is also easy to handle fixed-level trees with the same number of children for every parent.

v) **Network**

Network data types are old, but still imperfect art because of the complexity of relationships and user tasks. Commercial packages can handle small networks or simple strategies. Specialized visualizations can be designed to be more effective for a given task, such as a network diagram showing heavy telephone traffic on holidays.

**Task:**

i) **History Task**

History of actions can be kept to support undo, replay, and progressive modification. It is uncommon that a single user action produces the desired output. Information exploration is naturally a process with many steps, so it is important to keep the history of actions and allowing users to retrace their steps.

ii) **Relate Task**

We can view relationships among items. This task allows relationship among items to be visible by users.

iii) **Filter Task**

This task can filter out unexciting items. The key ideas in information visualization is that it applied dynamic queries to the items in the collection constitute. When users control the contents of the display, they can quickly focus on their interests by removing unnecessary items. Sliders, buttons, or other control

widgets coupled to fast display update is the goal, even when there are tens of thousands of displayed items.

## 2.3 Existing System Review

### 2.3.1 *Themescapes*

A themescapes [1] is a 'thematic terrain' that communicates the primary themes of a collection of a documents and the relative prevalence of those themes. Elevation in themescapes is a measure of theme strength. The example shown in Figure 2.1 refers to one of the themescapes model.

http://www.cartia.com

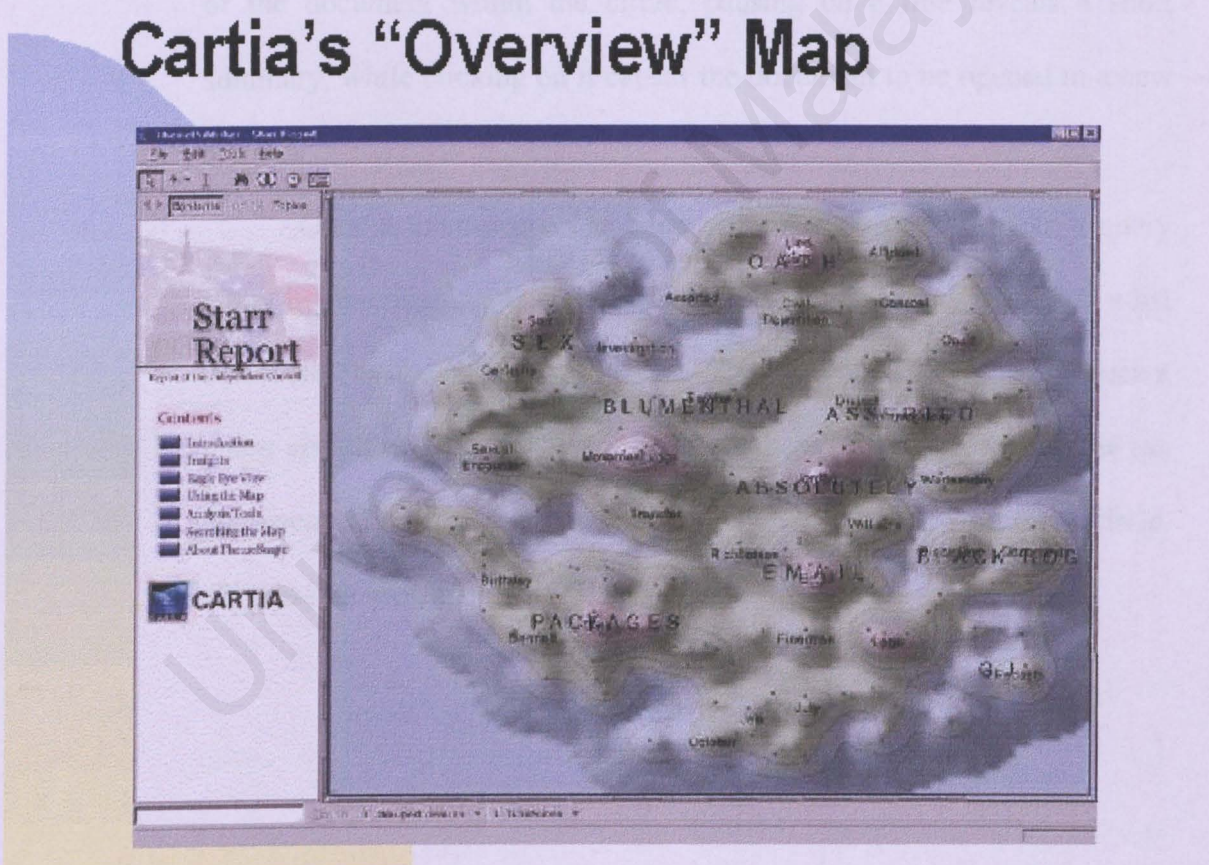



Figure 2.1: Main page of Themescape by Cartia

In themescapes, documents are represented by small points, and those with similar content are placed close together. Peaks appear when there is a

concentration of closely related documents. The valleys between peaks can be interesting because they contain fewer documents and more unique content. Topic labels reflect the two or three topics represented in a given area of the map.

Within the landscape metaphor, 'drilling down' to obtain more detail can begin by moving a focus circle to a location of interest: after a slight delay a brief list of the principal topics contained within the circle will appear. Further interaction (Figure 2.2) will display a list of the titles of the document within the circle; pausing on a title reveals a short summary, while clicking on it causes the document to be opened in a new window.

Once a themescape has been generated a user can make a query either by entering one or more keywords or by selecting words from a list discovered by the internal algorithms. The documents identified by such a query appear on the themescape with numbered dots representing the top documents. The dots so identified can be investigated by the focus circle. All these themescape

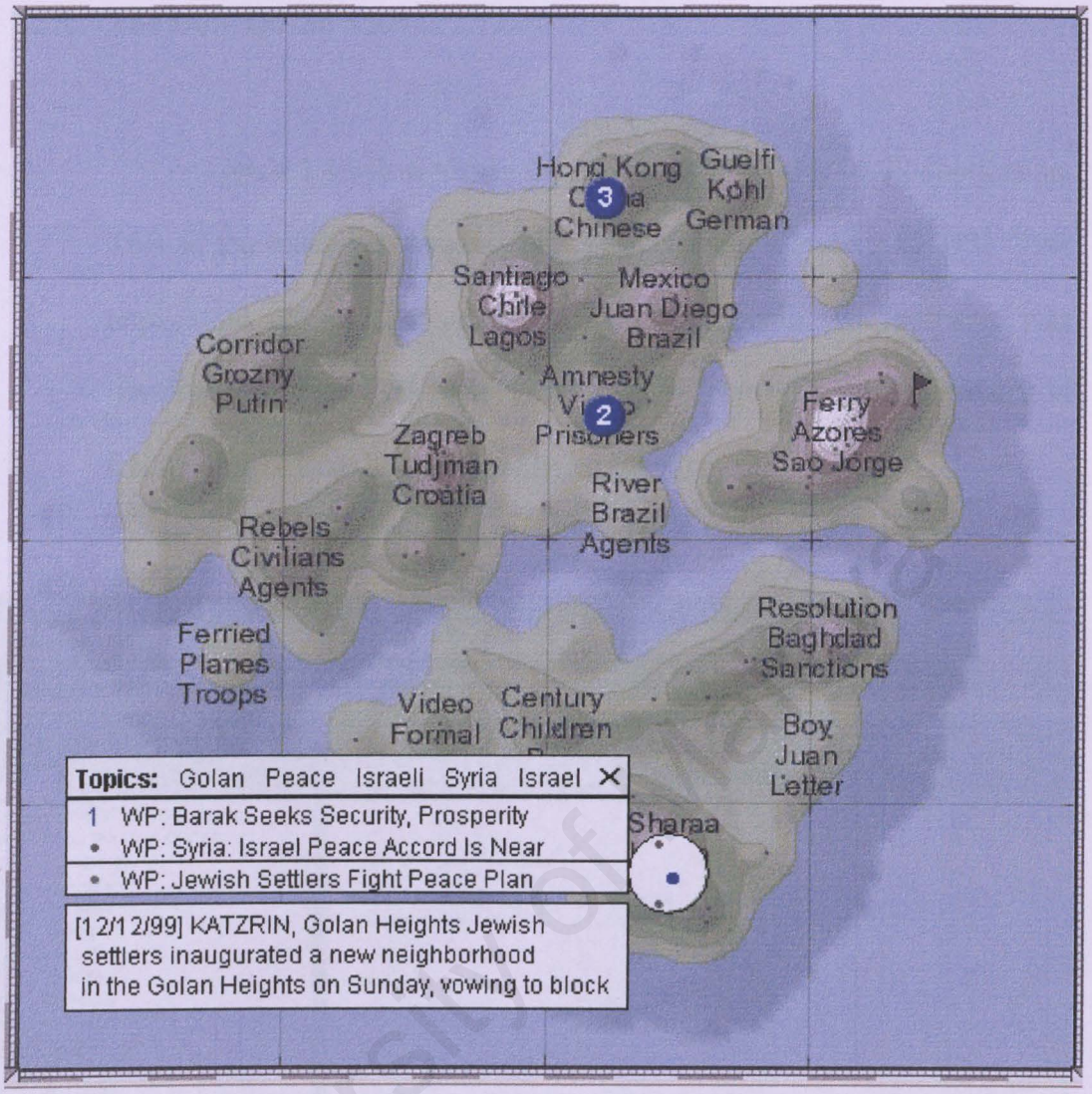



Figure 2.2: The detail of the Themescape

An advantage of the themescape is that its landscape metaphor and associated drilling down and flagging operations call upon innate human abilities for pattern recognition and spatial reasoning. Another advantage is that it applies equally to single paragraphs and collections of documents.

### 2.3.2 The Holy Quran Viewer 2.72

Figure 2.3 below shows the Holy Quran Viewer v2.72 application. This is the extended version from Holy Quran Viewer 2.51 [13]. This application covered the entire soorah in Al Quran. The software was developed by Jamal Al Nasir in year 2003. The software is available at free of charge from http://www.DivineIslam.com.

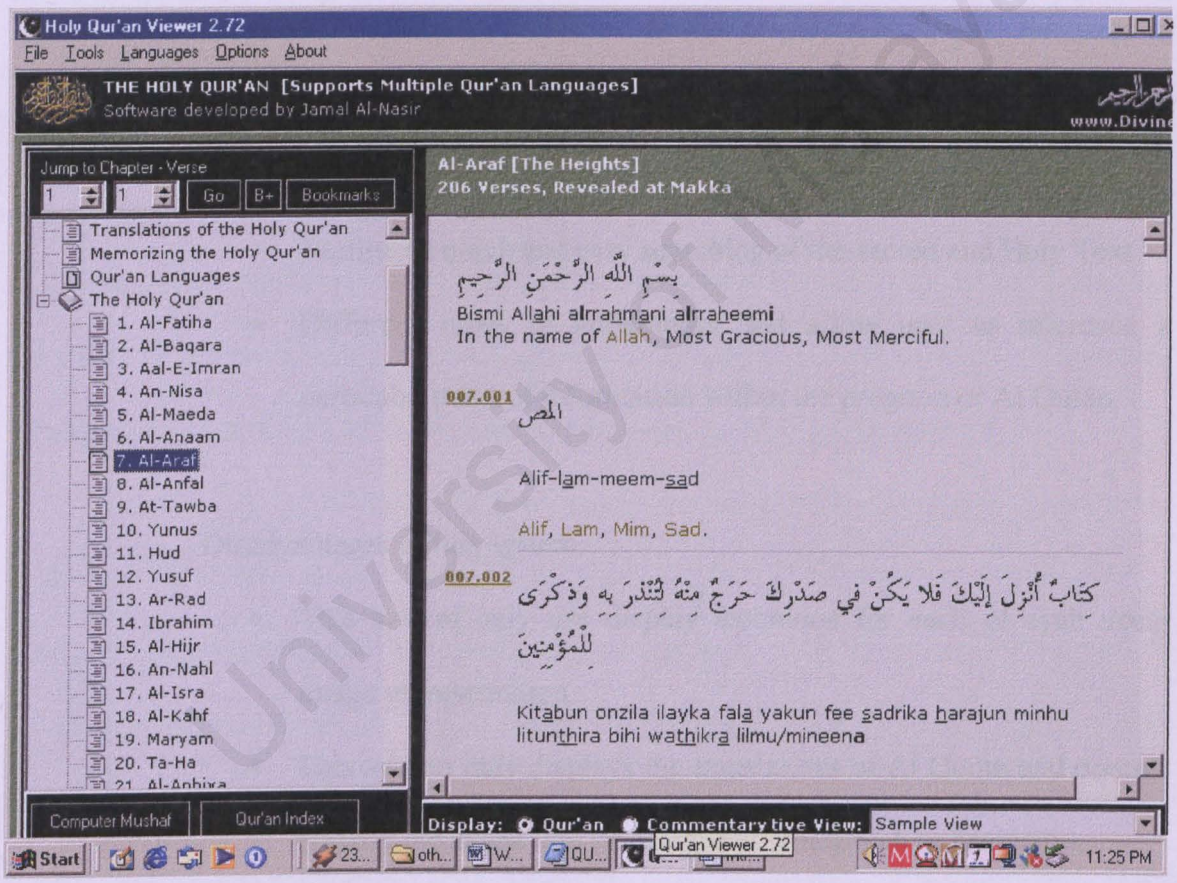



Figure 2.3: Interface of Holy Quran Viewer v2.72

The developer use hierarchical approach to display the content of Al Quran. Furthermore, indexing method also had been used to simplify searching ayahs in Al Quran.

Advantages of this system:

- The system is able to view the translation of ayahs Al Quran in different language around the world.
- The system enable user to view the entire ayahs in a simpler manner using hierarchical technique.
- The system provide text that is displayed in natural language to help user that new in reading Al Quran to pronounce the ayahs in a correct way.
- Facilitates quick and easy searching of the sacred and Holy Text.
- Different types of bookmarks that allow user to reference a particular point of information within the program or Al Quran.

Disadvantages of this system:

- This system only use display technique for each of ayah using image representation.
- This system only displays the translations of Al Quran and doesn't classify the ayahs into its categories (Madaniah or Makkiah).
- Not much different from its previous version (Holy Quran Viewer 2.51)

## 2.4 Summary

| Criteria | *Themescape* | *Quran Viewer 2.72* | *Themescape Quranic Visualization* |
|---|---|---|---|
| **Zooming** | ✓ | x | ✓ |
| **Indexing** | x | ✓ | ✓ |
| **Audio** | x | ✓ | x |
| **Search Makkiyah and Madaniah** | x | x | ✓ |
| **Information visualization** | ✓ | x | ✓ |
| **Free availability** | ✓ | ✓ | ✓ |

Table 2.1: System Comparison

All these researches were done mainly to gain information for this system. The information gathered includes the concepts and strategies of visualization of ayahs Al Quran, reviews on the existing visualization of ayahs Al Quran applications.

Research on visualization of ayahs Al Quran concepts and strategies is to have a better understanding on the requirements of this system. The review on visualization of ayahs Al Quran applications were done by browsing to some of the web site that provide the visualization of ayahs Al Quran. Assessing current existing systems or applications allows identification of the weaknesses that are to be overcome in this system. Meanwhile the strengths of existing visualization of ayahs Al Quran application were studied so that it can be adapted into this system.

# CHAPTER 3

## 3.1 Importance of Good Methodology

A good methodology that able to provide the effective ways of system development is best defined before the system starts and then becomes the framework to development staff.

Some benefits offers by a good methodology:

- Provides a standard framework that the developer does not have to reinvent the wheel for each system.
- Each method or tool in the methodology results in successful completion of each development task.
- Reviews procedures are available to identify any errors, inconsistencies and discrepancies during development.
- Increase the system quality by forcing the developer to produce flexible systems and adequate documentation.
- Provides better understanding of user needs and validation of user needs.
- Provides the management with tools to review system progress and checklist to access tasks and deliverables.
- Facilitates planning and controlling the system.

## 3.2 Development Models

Every software product has a lifetime-it start its life as a response to a user's need or as a new product concept and ends up being obsolete. The life span of software systems varies from product to product. During its lifetime, the software goes through various phases. Software life cycle is the period of time that starts when a software product is conceived and ends when the product is no longer available for use. The software life cycle typically includes a requirements phase, design phase, implementation phase, testing phase, installation and checkout phase, operation and maintenance phase, and, sometimes, a retirement phase.

Many theories and models have been advanced concerning how the software goes through these phases (and whether it goes through all the phases). A software development process model describes how and in what order these stages are put together to trace the entire life history of the product. Boehm states, 'The model reflects the underlying concept that each cycle involves a progression that addresses the same sequence of steps for each portion of the product and for each of its levels of elaboration from an overall concept of operation document down to the coding of each individual program. There are many life cycle models, the most prominent of which are the waterfall model, spiral model, throwaway prototype model, incremental model, operational model, component assembly model, and cleanroom software engineering. But in this specific system, I will briefly explain the spiral model because I have chosen this model as my methodology of system development.

### 3.2.1 Spiral Model

The methodology used in the development of this system is the Spiral model [5] as shown in Figure 3.1. Rather than represent the development process as a sequence of activities with some backtracking from one activity to another, the process is represented as a spiral. The spiral life cycle model is also a variation of the classic waterfall model. Each of the development phases is carried out in one or more cycles, each cycle beginning with a risk assessment and including a prototype to provide insight into the risk issues. The basic premise of the model is that a certain sequence of steps is repeated while developing or maintaining system. The steps are first done at a high level of abstraction, and then each loop of the spiral represents a repeat of the steps at successively lower levels of abstraction.

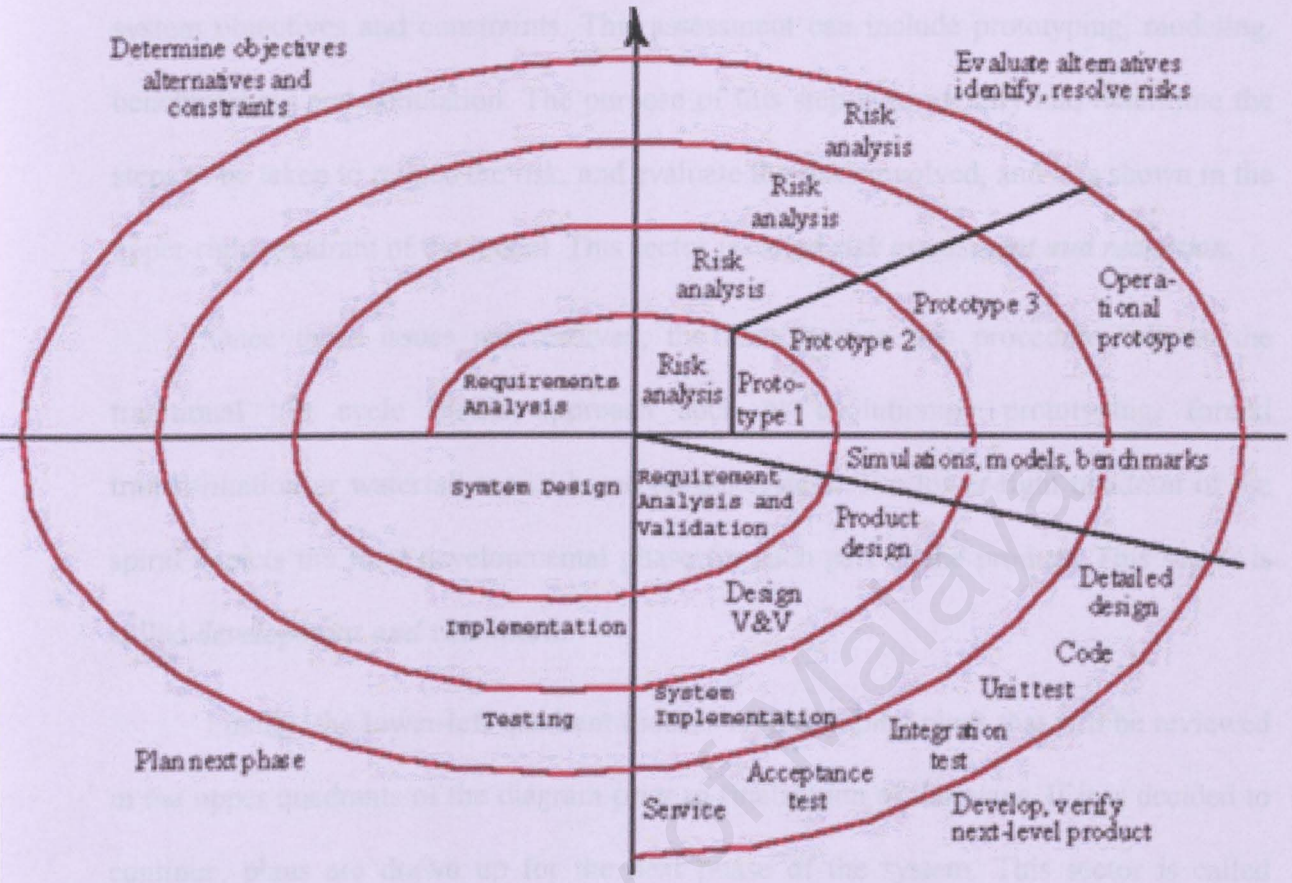



Figure 3.1: Spiral Model Methodology

**The 4 sectors in spiral model:**

The first sector is called the ***objective setting***. After a decision to proceed with the system is made, the spiral is initiated in the upper-left quadrant. This particular quadrant defines the objectives of the part of the system being addressed, alternative means of accomplishing this part of the system, and the constraints associated with these alternatives. Besides, system risks are also identified with alternatives strategies may be planned depends on the risks.

The next step involves assessing and analyzing the alternatives in regard to the system objectives and constraints. This assessment can include prototyping, modeling, benchmarking and simulation. The purpose of this step is to identify and determine the steps to be taken to reduce the risk, and evaluate the risks involved, and it is shown in the upper-right quadrant of the model. This sector is called ***risk assessment and reduction.***

Once these issues are resolved, the next step in this procedure follows the traditional life cycle model approach such as evolutionary prototyping, formal transformation or waterfall model based on the system. The lower-right quadrant of the spiral depicts the final developmental phase for each part of the product. This sector is called ***development and validation.***

Finally, the lower-left quadrant focuses on developing plans that will be reviewed in the upper quadrants of the diagram prior to finalization of the plans. If it is decided to continue, plans are drawn up for the next phase of the system. This sector is called ***planning.***

An important concept of the Spiral model is that the left horizontal axis depicts the major review that is required to complete each full cycle.

**Four Phase in System Development:**

Each loop in the spiral represents a phase of the development process. The inmost loop will be concerned with requirement analysis. The requirements gathered would include the interaction between subsystem, functionality, information retrieval, behavior, performance, interface and constraints of the system This loop will explain the functional

and non-functional requirements of the system. Besides, it will also describe the system requirements that will be divided into two categories; hardware requirements and software requirements.

The next loop will be concerned with system design. For this system, system design focuses on distinct attributes of the modules in this system program. The main page appearance and the organization of subsystem were designed in this stage. The overall system architecture, content design, interface representation, data structure, conceptual design and technical of this system are also required in this stage. In addition, the system design also includes transforming the requirements into a representation that can be assessed for quality.

The next loop will be concerned on the implementation of the system using the system design that has been defined in previous loop. The final loop will be concerned on system testing. Several testing that will be conducted are code testing, unit testing, integration testing and acceptance testing.

### 3.2.2 Justification of Methodology

The reasons for choosing Spiral model as the development methodology is because the strength of the model lies in its flexibility for managing a software life cycle [5]. With the adoption of the Spiral model, I can plan an examination of risk at each major abstraction. If there are any changes in the system requirement, I can just change it by building a new prototype, simulation, model or benchmark. Changes, addition, adjustment or elimination of specification or design can be done as system development progress.

The model accommodates a mixture of specification-oriented, process-oriented, object-oriented, or other approaches to software development. It is favored by most of the object-oriented software developers because of this strength.

## 3.3 Information Gathering Method

Method of gathering information regarding a system is necessary in order to establish understanding of the state and future requirement on the system study and provide the groundwork for the system design.

There is no underlying standard or procedure to be followed strictly as each single system is unique and data-gathering may be vary to suit the needs of each particular system. However, there are a certain number of methods that are commonly used in gathering-information such as collecting hard data like written documents or reports, interviewing, using questionnaires, observation and sampling.

As for this system, due to cost and tight schedule constraints as well as the difficulties in finding and getting domain experts whom are willing to help, method such as interviewing becomes the intermediary who obtained the user's requirement from the student in FSKTM and some lecturers from Academy of Islamic Study, University Malaya. The main data sources for system analysis were written documents, reference books, observation and other sources from the Internet.

There are five key data collection methods used for this system:

- Internet surfing
- Books and reference
- Supervisor's experience
- Observation and interview
- Questionnaire

**a) Internet Surfing**

Today cyber world has enabled any information to be obtained from the World Wide Web. The Internet offered a vast choice of sites to learn about programming languages and development software for free. This sites contained online tutorials and lessons on programming languages and software development tools. There were also online newsgroups and forums that would respond to the questions posted to them. These sites were very helpful especially when one needs to learn something new within a short period of time.

Numerous tools, applications and systems on visualization the ayah Al-Quran were obtained from the World Wide Web. I found many useful articles or tip to help me in developing my system using existing search engines such as:

- http://www.google.com
- http://www.yahoo.com
- http://www.planetsourcecode.com
- http://www.download.com
- http://www.freeware.com
- http://www.mamma.com

To obtain the desired information or relevant website, selecting the right keywords is crucial. Certain search engines that presented sites on visualization systems have to be purchased and it was for commercial purpose. Where else terms such as "visualization freeware tools" offered a vast choice of related sites of visualization tools. By and large, the Internet was the main source to provide

information on whole. The result from this research has been elaborated in detail in Chapter 2.

**b) Books and References**

Beside that, I also manage to find some related system on visualization in the University of Malaya Main Library. There are various books explaining about visualization from different aspect. But the book that I used most as a reference was *Information Visualization by Robert Spence*. My supervisor, Mrs. Raja Jamilah Raja Yusof, recommended this book.

Journals and documentations on visualization become the fundamental resource to understand the structure, function and the developing method of the preceding systems. Where as the newspapers and magazines on computer technology provide the latest news and updates on computer technology. FSKTM's documents room has a lot of senior's thesis that can be as a guideline for to write the thesis report. The format type of the report, organization of the heading and the content of the report can be refer from senior's thesis.

**c) Supervisor's Experience**

The most importance source of information is my supervisor, Mrs. Raja Jamilah Raja Yusof. A discussion with supervisor has been practiced from time to time in order to get help and advices during the development of the system.

**d) Observation and Interview**

Observation is one kind of informal information gathering method. By observing some of the current system, the policies and procedures can be clearly understood. To gather more precise information about Al-Quran, I have conducted an interview with Ustaz Zulkifly from Academy of Islamic Study. He is the Head Department of Al-Quran Studies.

**e) Questionnaire**

Questionnaires are part of the information collection method that I have used in completing this system. Questionnaires are distributed to respondents to get the user requirement. The questions are multiple-choice questions and rating questions where the respondents can choose any of them.

## 3.4 Summary

In order to produce a more efficient and better quality system, this system will be develop through several stages, by implementing the Spiral Model methodology. The first two stages, which are system review and requirement analysis, have been completed in the first semester. While for system design and system integration and testing, will be completed in the second semester.

The spiral model approach is selected for the development of this system because this method is flexible. In addition, risk analysis and prototype are performed in every stage.

Through the system development life cycle, system methodology is adopted to understand the current problem situation. Careful analysis and research has been conducted to determine the feasibility of the system and what is required of it. The system requirements are identified, translated into design and finally implemented via coding. The finished system is evaluated to meet the system objectives and requirements specification.

# CHAPTER 4

## 4.1 Introduction

After the literature search and review, the next step is to perform a detailed analysis. The main purpose of the system analysis phase is to learn exactly what takes place in the current software, and to determine and fully document in detail what should take place. The result of this process will be used to recommend improvement to the software.

Through system analysis, the programmer may add, delete and modify software components toward the goal of improving the overall software. The information gathered during this phase has provided alternative strategies to develop this software. Although software design can be identified and defined as a distinct activity, it must be compatible in both concept and implementation with essential development activities such as analysis and coding that precede or follow it. Through this phase also, the programmer can determine types of functional requirements and non-functional requirements, user requirements and also the system requirements for the software.

Therefore, this chapter will go through the first loop of the spiral methodology and first prototype should be delivered at the end of this phase based on the objectives that has been discussed in first chapter.

## 4.2 Requirement analysis

Mainly requirement mean "the effect that the clients wishes to be brought about in the problem domain "

Or

"A condition or capability that must be met by the system to solve a problem or achieve an objective "(IEEE, 1984).

Mainly, the requirement analysis will be divided into three main categories. There are functional requirements and non-functional requirements, user requirements and system requirements.

### 4.2.1 Functional Requirements

Functional requirement for a system describe the functionality or service that the system is expected to provide. Functional system requirement describe the system function in detail. The functional requirement of the system give a bright concept about the function carried out by the Themescape Quranic Visualization. With the functional requirement, user will know what the system will reach when certain data is being input and how it will function under certain reaction.

Functional requirements for Themescape Quranic Visualization has been divided into three modules as listed below:

| **Module** | **Functional Requirements** |
|---|---|
| User Search | 1. User can search the required ayah by clicking on the icon on the screen that represent the surah which the ayah belong. |

| | |
|---|---|
| | 2. User can choose whether to view Makkiyah or Madaniah ayah.<br>3. User can zoom in and out of each ayah that they intend to view. |
| Visualization Interface | 1. Each surah in Al Quran will be presented using different color and icon to differentiate the surah. |

Table 4.1: Functional Requirements

### 4.2.2 Non-functional Requirement

A non-functional requirement is a description of the features, characteristics, and attributes of the system. Non-functional requirements are as important as functional requirements. It is defined as constraints under which the system must operate and the standard, which must be met by the delivered system. The followings are the non-functional requirements identified in developing Themescape Quranic Visualization:

- **Reliability**

  This system to be developed must be able to perform required functions and tasks correctly. User shall get the correct and precise output from the data that had been stored in the database.

- **Scalability**

  This system must be capable of migrate or move from machine with different specification, with minimum or no changes to the underlying component. It must be able to meet this requirement as the basic structure of hardware and software environment is changing constantly.

- **Interactivity**

  The system shall provide a good user interface design where it will attract user to use and learn more about Al Quran oftenly. The system also provides easy navigation for user to navigate and to search required ayah or surah with the help of some pictures for better understanding.

### 4.2.3 User Requirements

User requirements should describe the functional and non-functional requirements of the system so that they are understandable by system users who do not have detailed technical knowledge. The user requirements must be written using natural language, forms and simple intuitive diagrams.

To obtain the user requirements, a set of questionnaire has been set up as shown in the appendix section. They are 20 respondents that are the undergraduate student from Faculty of Science Computer and Information Technology, University of Malaya, have been chosen to answer the question. This questionnaire consists of 18 questions that are divided into two main areas; computing skills and the knowledge of Al Quran. The analysis of the questionnaire will be discussed below.

#### 4.2.3.1 User Requirements Analysis

a) **User preference in presenting information**

**Result**

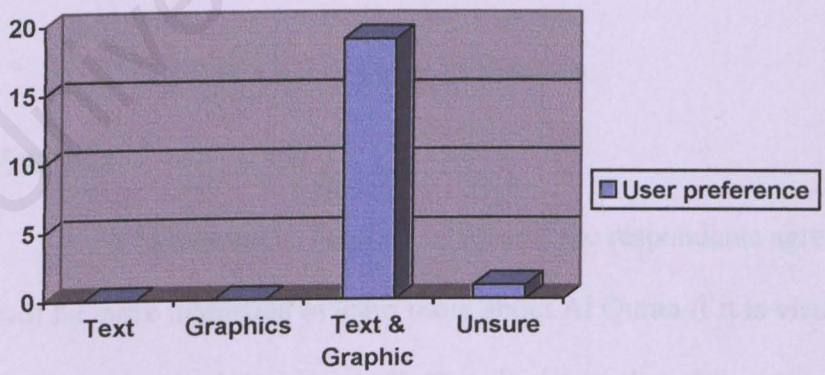



**Figure 4.1: User preference in presenting information**

**Analysis**

Figure 4.1 shows the respondent preferences on presenting the information. 19 respondents or 95% of them would like the information to be presented using the combination of text and graphic and only 5% of them unsure about it. We can assume that most of the respondents would like the information to be presented interactively rather than just static information.

b) **Al Quran Visualization**

**Result**

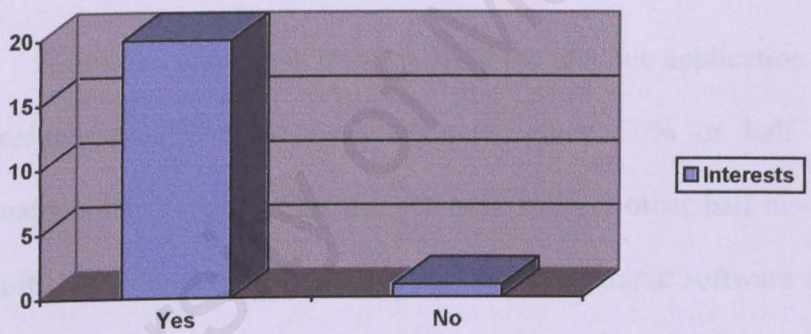



**Figure 4.2: Al Quran Visualization**

**Analysis**

As illustrated in Figure 4.2, 95% of the respondents agree that they will be more interested to learn more about Al Quran if it is visualized and only one respondent unsure about it. It shows that this proposed system will enhance their interest in Al Quran studies.

c) **Al Quran Application Use**

**Result**

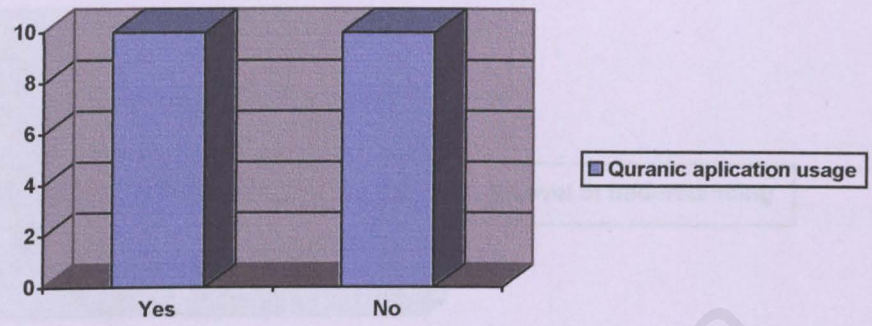



**Figure 4.3: Al Quran Application Use**

**Analysis**

Figure 4.3 shows the level of using the Quranic application among the respondents. The result is balances where 50% or half of the respondents have use the Quranic software and the other half never uses the software. Based on it, we can conclude the Quranic software is quite popular among the respondent although they are from computer science background students.

d) **The Understanding of the Content of Al Quran**

**Result**

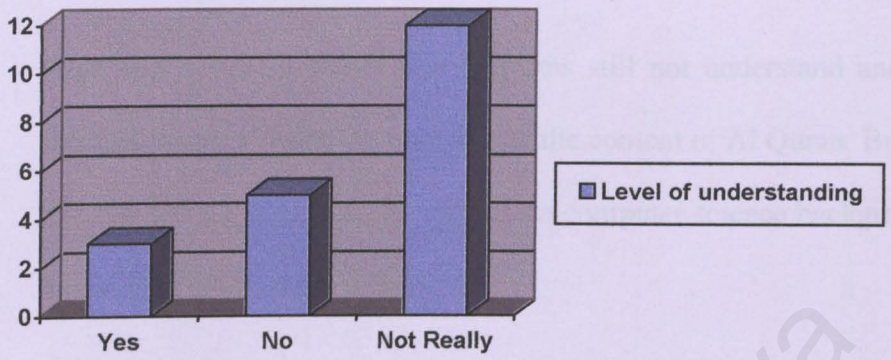



**Figure 4.4: Level of understanding the content of Al Quran**

**Analysis**

Figure 4.4 shows the level of understanding the meaning of the content of Al Quran among respondents. It is such worrying results where 85% of the respondents are not really and not know at all about the meaning of the content of Al Quran. And only 15% of them or only three respondents does know and understand the content of Al Quran. For the respondents who understand the content, all of them need to answer five questions to test their understanding about the content of Al Quran, and they have answer it correctly. The five questions that they need to answer are mainly about:

- Number of ayah in Al Quran
- Number of surah in Al Quran
- Longest surah in Al Quran

- Shortest surah in Al Quran, and
- The awareness of the difference of the number of ayahs in each surah

From this result, it shows that Muslims still not understand and do not seriously want to learn the meaning of the content of Al Quran. But maybe it is due to that all respondents are from computer science background and this might reflected the result.

e) **Finding Ayah in Al Quran**

**Result**

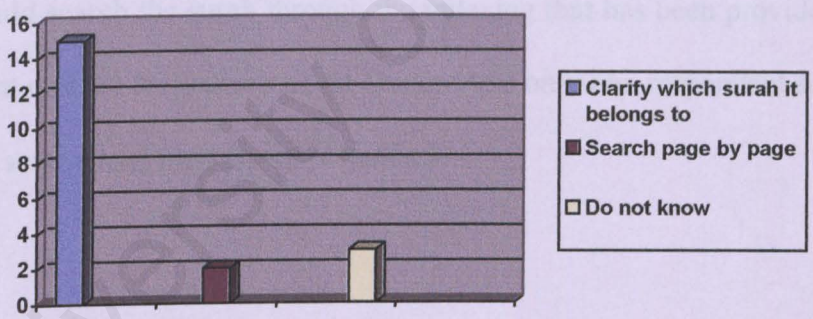



**Figure 4.5: Finding ayah in Al Quran**

**Analysis**

From the Figure above, we can see that 75% of the respondents will find the particular surah by clarifying which surah does the ayah belongs to. The remainder will search the ayah page by page and some of them do not know how to find it.

f) **Finding Surah in Al Quran**

**Result**

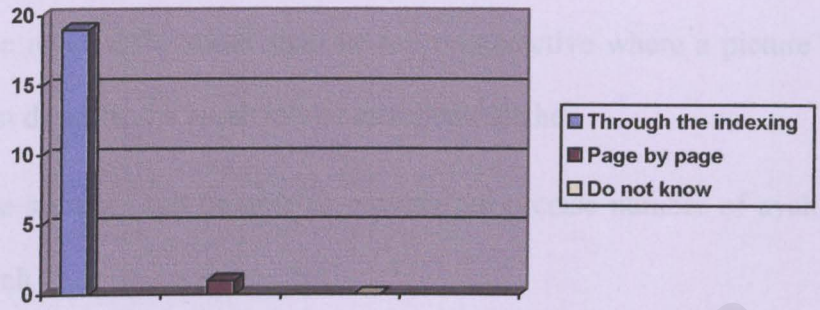



**Figure 4.6: Finding surah in Al Quran**

**Analysis**

From the Figure above, 95% of the respondents stated that they would search the surah through the indexing that has been provided at the front of each Holy Book of Al Quran. And only one respondent searching the surah using page-by-page method.

### 4.2.3.2 User Requirements Determination

Based on the analysis that has been conducted and answered that has been given by the respondents, the user requirements determination can be defined. The user requirements determination for Themescape Quranic Visualization is as follows:

- The system shall provide a 3-Dimension icon where user can easily find a particular surah in Al Quran. The surah will be arrange accordingly based on the indexing from the Holy Book of Al Quran.

- The system shall be able to differentiate between Makkiyah and Madaniah ayah. Different color will be assigned to each type of ayah to differentiate them.
- The icon of the surah shall be more interactive where a picture that can best describe the surah can be attached together.
- The system shall be able to provide the precise number of ayah in each surah.

### 4.2.4 System Requirements

Choosing the right hardware and software to be used for system development is very important to ensure the system succeeds. It is also vital as it can ensure that the system fulfills the system objectives. Basically, there are two types of system requirements. They are:

- Hardware requirements
- Software requirements

Below are the minimum hardware requirements for developing Themescape Quranic Visualization:

- 166 MHz Pentium Processor and above
- 64 MB SDRAM and Above
- 4GB Hard Disk and Above
- Other standard computer peripherals and additional devices

Below are the minimum software requirements for developing Themescape Qranic Visualization:

| Description | Technologies/Software |
|---|---|
| Operating system/ Platform | Microsoft Window XP Professional |
| Database | MySQL Server |
| Development Tools | Microsoft Visual Basic .NET |
| Graphic Editor | Adobe Photoshop |

Table 4.2: System requirements of Themescape Quranic Visualization

#### 4.2.4.1 Development Platform Chosen

Development Platform is one of the most important features in the development of the proposed system. There are many different type of development platform. Each of these development platforms has their own strength and weaknesses. In choosing the development platform, the function of the development platform have to been reviewed in detail to make sure it can support all the tools used and also function that will be carried out by the proposed system.

Windows XP Professional is built on the proven code base of Windows 2000, which features a 32-bit computing architecture, and a fully protected memory model. This makes Windows XP Professional the most reliable version yet.

The number one reason to move to Windows XP Professional is the overall value it offers. Windows XP Professional can help users reduce costs through improved management and increase productivity through improved reliability and ease of use. Hundreds of applications that did not run in Windows 2000 Professional will run on Windows XP Professional. Windows XP Professional supports the latest hardware standards. Other features are such as stays up and running reduces application failure and enhances windows security.

After reviewing other development platform, I choose Windows XP Professional as my development platform to develop the proposed system. Windows XP Professional is used as the operating system for the whole system. It is known to be more user-friendly and stable than other server based operating system. All the other developing tools can be run on this server.

#### 4.2.4.2 Database Management System Chosen

Database management system also is one of the important features in developing the proposed system. There are also several database management systems available in market today. Database management system has to be choosed based on their function and compatibility in the proposed system.

Ideally, a database language should allow a user to create the database and relation structures; it should allow a user to perform basic data management task, such as the insertion, modification and deletion of data from the relations; and it should allow a user to perform both simple and complex queries to transform the raw data into information.

From the research done, I have choose MySQL as the database management system in Themescape Quranic Visualization.

The MySQL database server is the world's most popular open source database. Its architecture makes it extremely fast and easy to customize. Extensive reuse of code within the software and a minimalistic approach to producing functionally-rich features has resulted in a database management system unmatched in speed, compactness, stability and ease of deployment. The unique separation of the core server from the storage engine makes it possible to run with strict transaction control or with ultra-fast transactionless disk access, whichever is most appropriate for the situation. It could handle very large databases an order of magnitude faster than what any database vendor could offer to us on inexpensive hardware.

As for Themescape Quranic Visualization, it requires large database of Al Quran and good management of the databases is very important. Besides, it is tightly integrated

with other Microsoft products. Therefore, MySQL database server is very suitable with Themescape Quranic Visualization.

#### 4.2.4.3 Development Tools

Visual Basic is a hugely popular programming language that is suitable for students and beginners as well as professional development. The .NET version is significantly different from older variants of Basic. Visual Basic .NET is the next version of Visual Basic. Rather than simply adding some new features to Visual Basic 6.0, Microsoft has reengineered the product to make it easier than ever before to write distributed applications such as Web and enterprise n-tier systems. Visual Basic .NET has two new forms packages (Windows Forms and Web Forms); a new version of ADO for accessing disconnected data sources; and streamlined language, removing legacy keywords, improving type safety, and exposing low-level constructs that advanced developers require.

Visual Basic .NET is fully integrated with the other Microsoft Visual Studio .NET languages. Not only can application components be developed in different programming languages, classes can now inherit from classes written in other languages using cross-language inheritance. With the unified debugger, multiple language applications can be debugged, irrespective of whether they are running locally or on remote computers. Whatever language used, the Microsoft .NET Framework provides a rich set of APIs for Microsoft Windows and the Internet.

Two things make Visual Basic .NET Standard 2003 easy to learn and use. One is the language itself, which is designed to be closer to natural English than others. The other is the array of tools and wizards that Microsoft provides, including a visual form designer for both Windows and Web systems. The programming environment is slick, with convenient features like docking and tabbed windows, system wizards, auto-completion and pop-up help in the code editor. The .NET version of Visual Basic benefits from full object-orientation and a rich class library. It also supports advanced features like multi-threading, which is a way of writing code to do background tasks.

Visual Basic .NET provides the easiest, most productive language and tool for rapidly building applications for Microsoft Windows. Ideal for existing Visual Basic developers as well as new developers in the Microsoft .NET development environment, Visual Basic .NET 2003 delivers enhanced visual designers, increased application performance, and a powerful integrated development environment (IDE).

Therefore, Visual Basic .NET is compatible for Themescape Quranic Visualization because of its extra features and it can simplify the use of database management.

## 4.3 Chronology of Al Quran

According to a list based upon Zakarshi [2], the chronological order of the revelation of the surah is as follows:

| Rank | Number of Surah | Name of Surah | Place |
|---|---|---|---|
| 1 | 96 | Al-'Alaq | Mecca |
| 2 | 68 | Al-Qalam | Mecca |
| 3 | 73 | Al-Muzammil | Mecca |
| 4 | 74 | Al-Muddathir | Mecca |
| 5 | 1 | Al-Fatihah | Mecca |
| 6 | 111 | Al-Lahab | Mecca |
| 7 | 81 | Al-Takwir | Mecca |
| 8 | 87 | Al-'Ala | Mecca |
| 9 | 92 | Al-Lail | Mecca |
| 10 | 89 | Al-Fajr | Mecca |
| 11 | 93 | Al-Dhuha | Mecca |
| 12 | 94 | Al-Nasyrah | Mecca |
| 13 | 103 | Al-'Asr | Mecca |
| 14 | 100 | Al-'Adiyat | Mecca |
| 15 | 108 | Al-Kauthar | Mecca |
| 16 | 102 | Al-Takathur | Mecca |
| 17 | 107 | Al-Ma'un | Mecca |
| 18 | 109 | Al-Kafirun | Mecca |
| 19 | 105 | Al-Fil | Mecca |
| 20 | 113 | Al-Falaq | Mecca |
| 21 | 114 | Al-Nas | Mecca |
| 22 | 112 | Al-Ikhlas | Mecca |
| 23 | 53 | Al-Najm | Mecca |
| 24 | 80 | 'Abasa | Mecca |
| 25 | 97 | Al-Qadr | Mecca |
| 26 | 91 | Al-Syams | Mecca |
| 27 | 85 | Al-Buruj | Mecca |
| 28 | 95 | Al-Tin | Mecca |
| 29 | 106 | Al-Quraisy | Mecca |
| 30 | 101 | Al-Qari'ah | Mecca |
| 31 | 75 | Al-Qiyamah | Mecca |
| 32 | 104 | Al-Humazah | Mecca |
| 33 | 77 | Al-Mursalat | Mecca |
| 34 | 50 | Qaaf | Mecca |
| 35 | 90 | Al-Balad | Mecca |
| 36 | 86 | Al-Tariq | Mecca |
| 37 | 54 | Al-Qamar | Mecca |

| 38 | 38 | Al-Sad | Mecca |
|---|---|---|---|
| 39 | 7 | Al-'Araf | Mecca |
| 40 | 72 | Al-Jinn | Mecca |
| 41 | 36 | Yaasin | Mecca |
| 42 | 25 | Al-Furqan | Mecca |
| 43 | 35 | Fatir | Mecca |
| 44 | 19 | Maryam | Mecca |
| 45 | 20 | Taha | Mecca |
| 46 | 56 | Al-Waqi'ah | Mecca |
| 47 | 26 | Al-Syu'ara' | Mecca |
| 48 | 27 | Al-Naml | Mecca |
| 49 | 28 | Al-Qasas | Mecca |
| 50 | 17 | Al-Isra' | Mecca |
| 51 | 10 | Yunus | Mecca |
| 52 | 11 | Hud | Mecca |
| 53 | 12 | Yusuf | Mecca |
| 54 | 15 | Al-Hijr | Mecca |
| 55 | 6 | Al-An'am | Mecca |
| 56 | 37 | As-Saffat | Mecca |
| 57 | 31 | Luqman | Mecca |
| 58 | 34 | Saba' | Mecca |
| 59 | 39 | Al-Zumar | Mecca |
| 60 | 40 | Al-Mu'min | Mecca |
| 61 | 41 | Fussilat | Mecca |
| 62 | 42 | Al-Syura | Mecca |
| 63 | 43 | Al-Zukhruf | Mecca |
| 64 | 44 | Al-Dukhan | Mecca |
| 65 | 45 | Al-Jaasiyah | Mecca |
| 66 | 46 | Al-Ahqaf | Mecca |
| 67 | 51 | Al-Dzariyat | Mecca |
| 68 | 88 | Al-Ghasyiyah | Mecca |
| 69 | 18 | Al-Kahfi | Mecca |
| 70 | 16 | Al-Nahl | Mecca |
| 71 | 71 | Nuh | Mecca |
| 72 | 14 | Ibrahim | Mecca |
| 73 | 21 | Al-Anbiya' | Mecca |
| 74 | 23 | Al-Mu'minun | Mecca |
| 75 | 32 | Al-Sajdah | Mecca |
| 76 | 52 | Al-Tur | Mecca |
| 77 | 67 | Al-Mulk | Mecca |
| 78 | 69 | Al-Haqqah | Mecca |
| 79 | 70 | Al-Ma'arij | Mecca |
| 80 | 78 | Al-Naba' | Mecca |
| 81 | 79 | Al-Nazi'at | Mecca |
| 82 | 82 | Al-Infitar | Mecca |

| 83 | 84 | Al-Insyiqaq | Mecca |
|---|---|---|---|
| 84 | 30 | Al-Rum | Mecca |
| 85 | 29 | Al-Ankabut | Mecca |
| 86 | 83 | Al-Mutaffifin | Mecca |
| 87 | 2 | Al-Baqarah | Madinah |
| 88 | 8 | Al-Anfaal | Madinah |
| 89 | 3 | Al-Imran | Madinah |
| 90 | 33 | Al-Ahzaab | Madinah |
| 91 | 60 | Al-Mumtahinah | Madinah |
| 92 | 4 | Al-Nisa' | Madinah |
| 93 | 99 | Al-Zalzalah | Madinah |
| 94 | 57 | Al-Hadid | Madinah |
| 95 | 47 | Muhammad | Madinah |
| 96 | 13 | Al-Ra'd | Madinah |
| 97 | 55 | Al-Rahman | Madinah |
| 98 | 76 | Al-Insan | Madinah |
| 99 | 65 | Al-Talaq | Madinah |
| 100 | 98 | Al-Bayyinah | Madinah |
| 101 | 59 | Al-Hasyr | Madinah |
| 102 | 110 | Al-Nasr | Madinah |
| 103 | 24 | Al-Nur | Madinah |
| 104 | 22 | Al-Hajj | Madinah |
| 105 | 63 | Al-Munafiquun | Madinah |
| 106 | 58 | Al-Mujadalah | Madinah |
| 107 | 49 | Al-Hujuraat | Madinah |
| 108 | 66 | Al-Tahrim | Madinah |
| 109 | 61 | Al-Saff | Madinah |
| 110 | 62 | Al-Jumu'ah | Madinah |
| 111 | 64 | Al-Taghabun | Madinah |
| 112 | 48 | Al-Fath | Madinah |
| 113 | 9 | Al-Taubah | Madinah |
| 114 | 5 | Al-Ma'idah | Madinah |

Table 4.3: Chronology of Surah in Al-Quran

To know the origin and order of some of the revelation is important for understanding its meaning that can often be more easily grasped if one knows the time and circumstances that relate to it. For instance, many ayahs from Makkan period may be especially meaningful to Muslims living in a strongly un-Islamic environment, while

some of the Madinan period would appeal much to Muslims who are in the process of formation of the *umma*.

## 4.4 Prototype One


Figure 4.7: Prototype 1 (Themescape Quranic Visualization)

Figure 4.7 above shows the first prototype of Themescape Quranic Visualization. This first prototype is based on the objectives set during the first chapter of this system. Besides, this prototype is built based on the themescape visualization technique. To develop this prototype, I used Microsoft Visual Basic .NET. But this prototype is still on its early stage and will be changed and modified when more requirements discovered and moves on to the next phase of the system methodology. This prototype gives the overview of the Themescape Quranic Visualization's interface.

Each circle in the prototype represents the juzuk that contained in the Holy Book of Al Quran. And we can view the surah that belongs to the juzuk using the Combo Box that has been provided inside each of the circle. But the problem that occurred is when a surah is belong to two juzuk consecutively. For example, surah Al Baqarah is located in between the first and second juzuk in Al Quran. However, this problem will surely be solved when the progress is moved on to the next phase.

Besides, this prototype has been come up based on the user requirement that has been done by gathering some information from the user. Most of the respondents said that it would increase their interest to learn about Al Quran if it is visualized using both combination of text and graphic presentation. Therefore, although this prototype has not been fully implied both presentation technique, but the main idea of using text and graphic presentation is there in the first prototype. Surely, it will be improved from time to time.

## 4.5 Summary

This chapter describes the detail of the requirements of the system, ranging from functional, non-functional to hardware and software requirements. Besides that, development tools and technology are also has been elaborated. The next chapter will continue to give a clearer picture of the system by showing the system designs.

# CHAPTER 5

## 5.1 Introduction

System design (Whitten, J.L., Bentley, L.D. and Dittman, K, 2002) is a creative process of transforming the problem into solution and the description of the solution. The goal of system design is to translate the requirements defined during the system analysis phase into a working model or representation of an entity that will be built later. During this phase, quality is fostered. System design involves designing of program, database and user interfaces. System design has to go through a thorough modification and testing before coming to a complete system. Amendment has to be done on every occurrence of mistakes especially in coding, user interfaces and database design. Below is the system design process for Themescape Quranic Visualization.

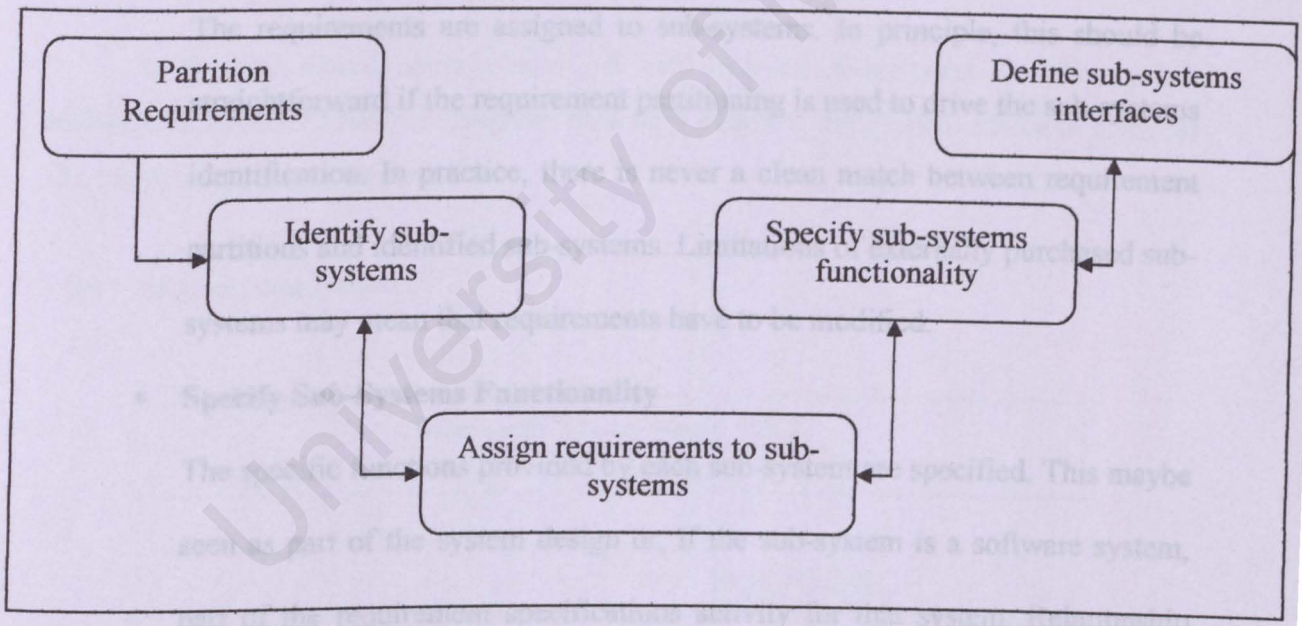



Figure 5.1: System Design Process

These are activities that will be conducted in system design process:

- **Partition Requirements**

  The requirements are analyzed and collected into related groups. There are usually several possible partitioning options and a number of alternatives maybe produced at this stage of process.

- **Identify Sub-Systems**

  Different sub-systems that can individually or collectively meet the requirements are identified. Groups of requirements are usually related to sub-systems, so this activity and requirements partitioning maybe amalgamated. However, the sub-systems identification may also be influenced by other organizational or environmental factors.

- **Assign Requirements to Sub-Systems**

  The requirements are assigned to sub-systems. In principle, this should be straightforward if the requirement partitioning is used to drive the sub-systems identification. In practice, there is never a clean match between requirement partitions and identified sub-systems. Limitations of externally purchased sub-systems may mean that requirements have to be modified.

- **Specify Sub-Systems Functionality**

  The specific functions provided by each sub-system are specified. This maybe seen as part of the system design or, if the sub-system is a software system, part of the requirement specifications activity for that system. Relationship between sub-systems should also be identified at this stage.

- **Define Sub-System Interface**

This activity involves in defining interfaces that are provided and required by each sub-systems. Once these interfaces have been agreed, parallel development of the sub-system becomes possible.

Under this chapter, the system design will be discussed into the following few components:

- System Functionality Design
- Database Design
- Graphical User Interface Design

## 5.2 System Functionality Design

In system functionality design, it will include description on the system architecture, context data flow diagram, data flow diagram, and system structure chart for Themescape Quranic Visualization.

### 5.2.1 System Architecture

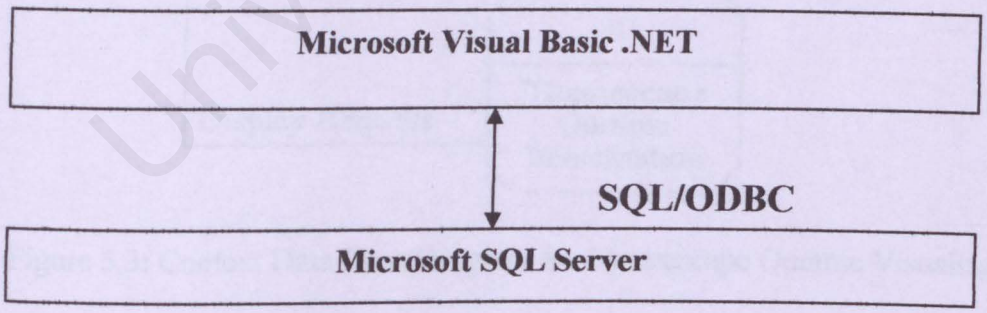



Figure 5.2: Two Layers in System Data Flow

The Themescape Quranic Visualization is based on the two-tier client/server architecture as shown in Figure 5.2. In two-tier architecture, the business rules are removed from the client and are executed on a system in between the user interface and the data storage system. The client application provides user interface for the system. The business rules server ensures that all of the business processing is done correctly. It serves as an intermediary between the client and the data storage. In this type of architecture, the client would never access the data storage system directly. This type of system allows for any part of the system to be modified without having to change the other two parts. Since the parts of the application communicate through interfaces, then as long as the interface remains the same, the internal working can be changed without affecting the rest of the system.

### 5.2.2 Context Data Flow Diagram

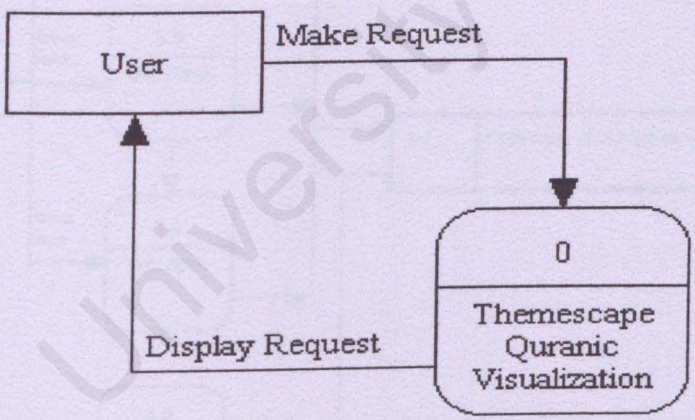



Figure 5.3: Context Data Flow Diagram for Themescape Quranic Visualization

A context data flow diagram defines the scope and boundary for the system and system. Because the scope of any system is always subject to change, the context diagram

also subject to constant change. Figure 5.3 shows the process where the user make a request from the system and the system will display the request back to the user.

### 5.2.3 Data Flow Diagram (DFD)

A data flow diagram (DFD) is a tool that depicts the flow of data through a system and the work or processing performed by that system (Whitten, J.L., Bentley, L.D. and Dittman, K, 2002). It represents how the whole system works in a simple and understandable way. The following are displays DFD for the Themescape Quranic Visualization.

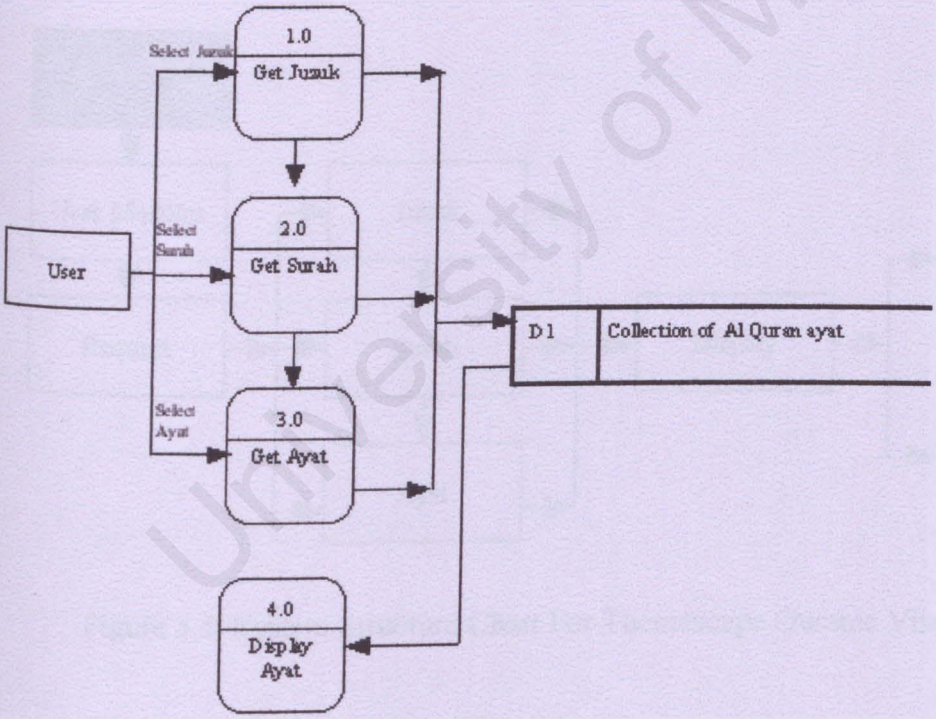



Figure 5.4: Data Flow Diagram for Themescape Quranic Visualization

Figure 5.4 shows the activities in Themescape Quranic Visualization, included how user can acquire Al Quran ayat from database. As one can see, the process to acquire ayat from database can be in parallel or sequential way. Database will return the acquired ayat and display it to the user.

### 5.2.4 System Development Structure Chart

Structure chart is like a treelike diagram and based on the functionality modules. A module is a group of instructions – a paragraph, block, subprogram, and subroutine. It is used to depict high-level abstraction of a specified system. Modules are factored, from top-down, into sub-modules. Apart from this, system structure chart also describes the interaction between modules in a system. Studying the flow of data through the program derives the structure chart.

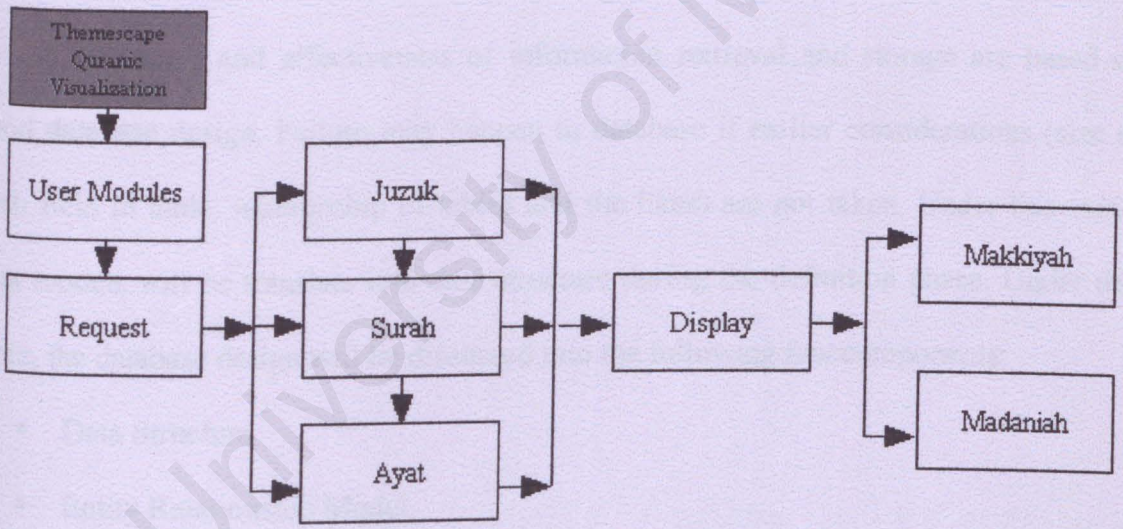



Figure 5.5: System Structure Chart For Themescape Quranic Visualization

**User Modules:**

This module is designed for users. As shown in figure 5.5, this module provides much functionality to the users. The users can search and view the ayat here. They can choose whether to view Makkiyah or Madaniah ayat.

## 5.3 Database Design

A database is an integrated collection of logically related data stored in different types of records, and in a way that makes them accessible for multiple applications. Database design involves identifying the user data requirements and determining how these data should be structured from these requirements. It transformed the unstructured information and the processing requirements of an application into representations that define the functional specifications.

Efficiency and effectiveness of information retrieval and storage are based on good database design. Failure may happen to database if earlier considerations (size of each field in table, relationship of tables and the likes) are not taken. Under this stage, data models will be translate into data structure during the definition phase. Under this topic, the database design will be discussed into the following few components:

- Data Structure
- Entity Relationship Model
- Data Dictionary

### 5.3.1 Data Structure

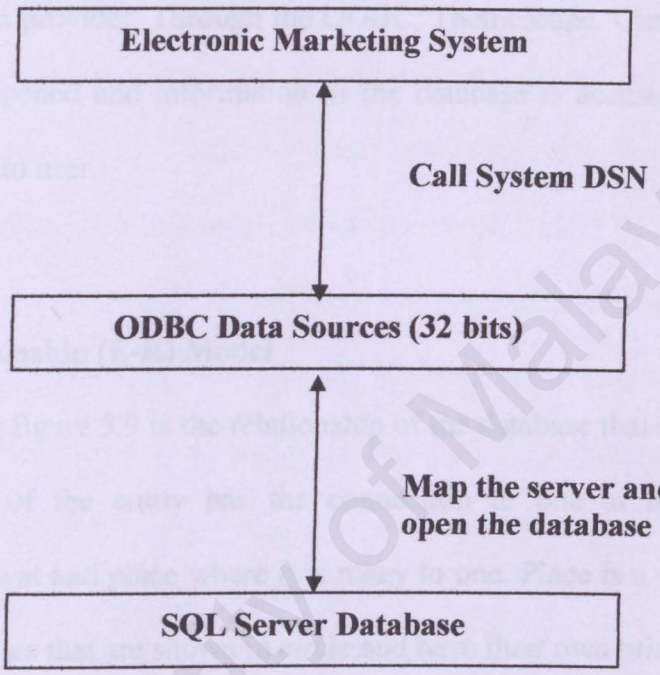



Figure 5.6: ODBC 32 as "Middleman" Between Themescape Quranic Visualization and SQL Server Database

The database management software of Themescape Quranic Visualization is Microsoft SQL Server. It is crucial to configure the connection between SQL Server and the application, in this case, the VB .NET files. The figure 5.8 illustrates the mapping of the SQL Server to the system via Open Database Connectivity (ODBC).

In Themescape Quranic Visualization, the system needs to use 32 bits version of the ODBC that compatible with Windows XP. It also needs to configure itself to use the

system Data Source Name (DSN) connectivity, so that the system can access the database. For example, when a user clicks the search ayah in the respective page, the system will call the Data Source Name (DSN) to establish the connection string of system to database. The system DSN that drives the connection is SQL Server.

32-bit Open Database Connectivity (ODBC) is used to stores information on how to connect to the data provider. Through the ODBC, Themescape Quranic Visualization database device is opened and information in the database is accessible. Requests are processed and return to user.

### 5.3.2 Entity Relationship (E-R) Model

The following figure 5.9 is the relationship of the database that illustrated with an E-R diagram. Most of the entity has the connection of one to many. Except the connection between ayat and place where it is many to one. Place is a weak entity. Each entity has their attributes that are shown in circle and have their own primary key.

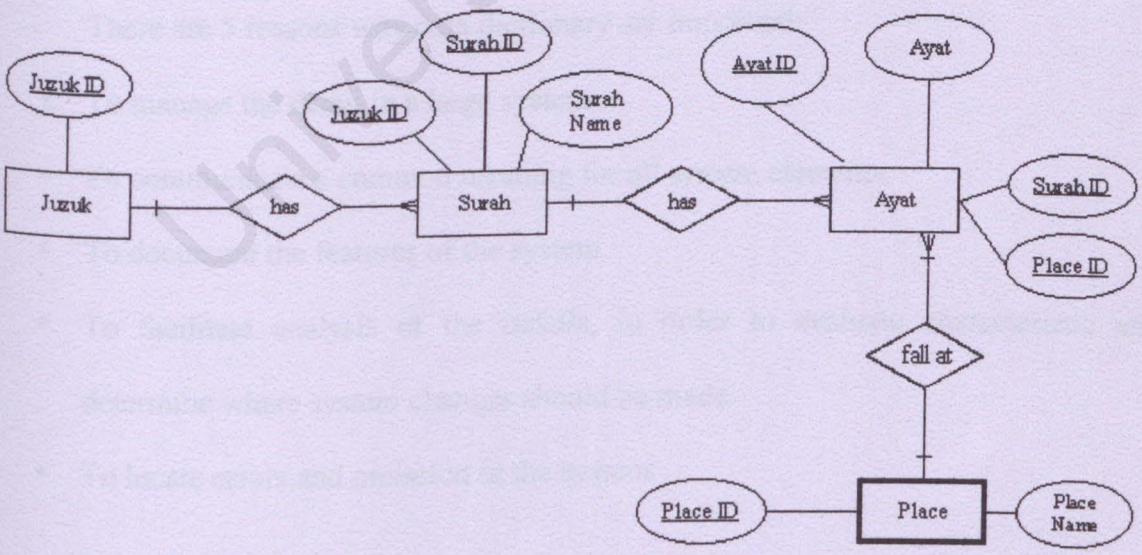


Figure 5.7: E-R Diagram of database in Themescape Quranic Visualization

## 5.4 Data Dictionary

As most of us know, the volume of data in most of applications is substantial (more than a single analyst can easily keep track of). When teams of analysts work on a system, the task of coordinating data definition becomes more complex. Therefore, a data dictionary has to be developed in order to let system analysts and programmers to keep track of data definition used in the system. Individuals depend on the definitions others established and the assumption they made about data specification. A data dictionary is a repository of elements in a system. As the name suggest, these elements center on data and the way they are structured to meet user requirements and organizational needs. In a data dictionary, a list of all the elements composing the data following a system can be found. The major elements are data flows, data stores and process. The data dictionary stores details and description of these elements.

There are 5 reasons why data dictionary are important:

- To manage the detail in a large system.
- To communicate a common meaning for all system elements.
- To document the features of the system.
- To facilitate analysis of the details, in order to evaluate characteristic and determine where system changes should be made.
- To locate errors and omission in the system.

The following are the data dictionary that explains the items and fields of the database that used in the Themescape Quranic Visualization. The database name is (not sure yet).

**(Notes: * Primary Key)**

| **Table Name** | Juzuk | | |
|---|---|---|---|
| **Description** | Contain information of juzuk | | |
| **Field Name** | **Data Type** | **Length** | **Description** |
| * Juzuk ID | varChar | 3 | The identification of juzuk |

Table 5.1: Juzuk Table

| **Table Name** | Surah | | |
|---|---|---|---|
| **Description** | Contain information of surah | | |
| **Field Name** | **Data Type** | **Length** | **Description** |
| * Surah ID | varText | 3 | The identification of surah |
| * Juzuk ID | varChar | 3 | The identification of juzuk |
| SurahName | varText | 15 | The name of surah |

Table 5.2: Surah Table

| Table Name | Ayat | | |
|---|---|---|---|
| Description | Contain information of ayat | | |
| **Field Name** | **Data Type** | **Length** | **Description** |
| * Ayat ID | varChar | 4 | The identification of ayat |
| * Surah ID | varText | 3 | The identification of surah |
| * Place ID | varChar | 2 | The identification of place |
| Ayat | varText | 30 | The name of ayat |

Table 5.3: Ayat Table

| Table Name | Place | | |
|---|---|---|---|
| Description | Contain information of place where the ayah is falled | | |
| **Field Name** | **Data Type** | **Length** | **Description** |
| * Place ID | varChar | 2 | The identification of place |
| Place Name | varText | 7 | The name of the place |

Table 5.4: Place Table

## 5.5 Graphical User Interface Design (Prototype 2)

User interface design is the specification of a dialogue or conversation between the system user and the computer. This dialogue generally results in data input and information output. There are several styles of graphical user interfaces. Some of the styles to be used in this system are pull-down and cascading menu, iconic menu, help system, and etc. Traditionally, these styles were viewed as alternatives, but they are increasingly blended. This section presents the graphical interface design for Themescape Quranic Visualization.


Figure 5.8: Main window with View menu

Figure 5.8 shows the main window. The main window is a blank window with yellow in color where user can choose whether to view it in small, normal or large size. The toolbar allows user to see the tabulation of surahs in Al Quran.

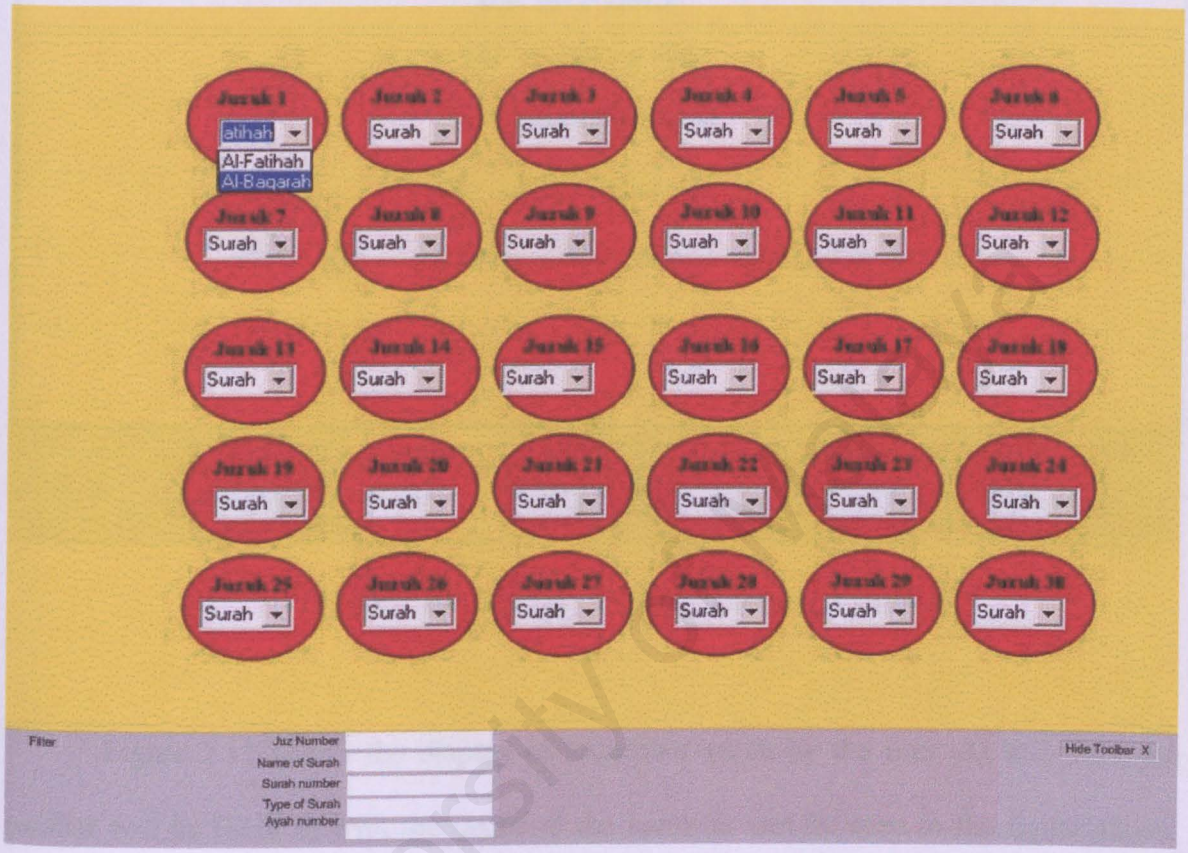



Figure 5.9: Selection window

Figure 5.9 shows the window for selection of required juzuk and surah that the user intended to view. User can choose the surah from the combo box given in each circle of juzuk.

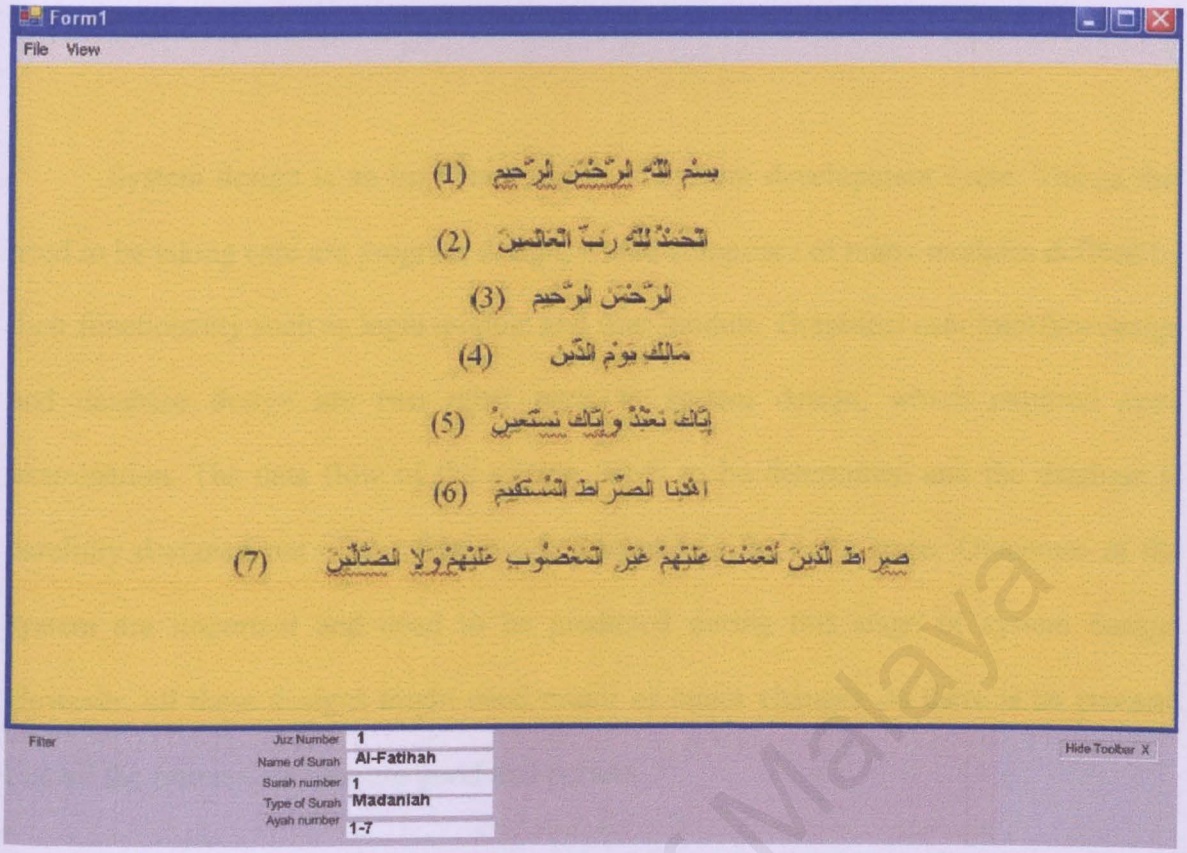



Figure 5.10: Display of selected surah (al Fatihah)

Figure 5.12 shows the display of requested surah by the user. At this time, the toolbar will be filled in with the detail of the surah as can be seen in the figure above. Besides, user can choose to view only Makkiyah or Madaniyah ayah from the filter box that has been provided.

## 5.8 Summary

System design is an important aspect in system development cycle. Things that need to be taking care are program design, which comprises of many modules defined by their functionality such as login module and user module. Graphical user interface design and database design are two other parts in system design, which required extra examination. The data flow of the system needs to be determined and the database is carefully designed out of the framework designed in the early stage. Outcomes of the system are important and need to be predicted during this stage of system design. However, all these designs might need minor or major changes, as there is no promise that all the primary designs are good and perfect.

# CHAPTER 6

## 6.1 Introduction

The requirement analysis, methodology and system design phases do not have a clear boundary in a software project. Each phase tends to overlap one another. System implementation is a process that converts the system requirements and design into program codes.

## 6.2 Development Environment

Development environment has certain impact on the development process of a good software system. The suitability of the hardware and software chosen is very important because it will not only help to expedite the system developments but determine the success of the project. The hardware and software tools used to develop the entire system are as below:

### 6.2.1 Hardware Requirements

The hardware used to develop the system is listed:

- Pentium 4 (1.8GHz Processor)
- Memory – 256MB SDRAM and above
- 40 GB hard disk

### 6.2.2 Software Tools Requirements

Table 6.1 illustrates the software tools used to develop the entire system:

| Current Software | Proposed Software | Purpose | Description |
|---|---|---|---|
| Microsoft Windows XP Professional | Microsoft Windows XP Professional | System Requirement | Operating System |
| Microsoft Internet Information Service | None | System Requirement | Web Server host [Final Stage] |
| Macromedia Dreamweaver MX, SWiSH 2.0, Hyper Text Markup Language (HTML) | Microsoft Visual Basic. NET | System Development | Development tools, coding |
| None | MySQL Server | System Development | Build the database to store and manipulate the data |
| Adobe Photoshop | Adobe Photoshop | Interface Design | Image design and creation |

Table 6.1: Summary of Software Tools

## 6.3 Modification of Development Tools

As can be seen in table 6.1, I have made big changes to what I have proposed in Chapter 4. The changes are made because there are so many problems related to software that I have proposed. The most big change is that I did not used any database in my system. This is because I have so many problems to implement into my system. It took so many of times to search for the right and suitable codes. The system use Unicode character and the data type is **nvarchar**. So it is quite hard to put the database that have **nvarchar** data type. Then I try to use Microsoft SQL Server as have been asked by the supervisor. The same thing is that I have to learn a new thing and there is no much time left. Therefore I came out with just display the ayah inside the HTML. Each surah is saved using .txt. in my opinion, the outcome is as same as like using the MySQL Server. Because my system do not require any input from the user. The user just have to click on the respective circle and the ayah will appear.

The other major change that I have made is turn the system from stand-alone system into web-based system. The reason is same that it do not make any different from stand-alone system. The web-based system will give an option whether to upload it in the Internet. To make this system as a web-based, I have used development tools such as Macromedia Dreamweaver MX and SwiSH 2.0 instead of Microsoft Visual Studio. NET. Besides that, the system do not use any programming language to generate the circle shape and the link from one page to another. It just used Action Script to link Flash page to another HTML. As have been proposed in the project objectives in Chapter 1, the system need to use a suitable algorithm to generate the circle that represent and visualize

each surah in Al-Quran. Therefore the system should use proper and correct programming language to generate and create the circle, and the best programming language to suite it is OpenGL.

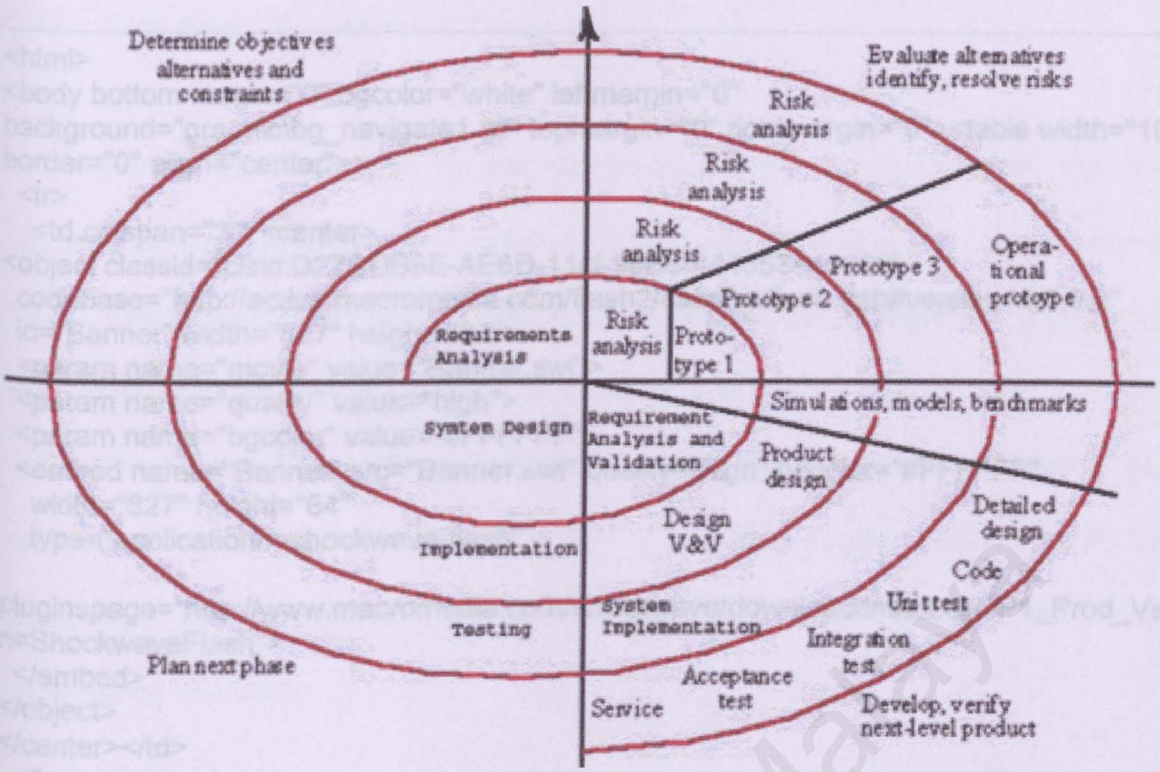
As we know, to generate a circle, we need to use a complex formula where it contains the Cosinus (cos), Sinus (sin) and Tangen (tan). It also used the $Y = (Pi) \times r^2$ formula. This is the formula to make a circle Pi = 3.142 and r is the radius of the circle. When I looked back at the formula, it seems so complicated. Therefore I generate the circle using Adobe Photoshop. The formula is quite simple. I have chose Surah Al-Syuara' (23) as the default size of the circle. This circle represent number of ayah that contained in each surah. Surah Al-Syuara' has been chosen as the default size because it contained the most number ayah, that is 227 ayahs. And to make the circle for Surah Al-Fatihah (1) that contained 7 ayahs. Therefore the ratio for Surah Al-Fatihah from Surah Al-Syuara' is 3%. From here, I make the circle 3% from the circle of Surah Al-Syuara'. And because Surah Al-Fatihah is one of the smallest surah in Al-Quran, the circle that has been generated is small. Therefore, to make it easier for the user to view it, the circle will transform into a bigger size. To make it easy for user to differentiate between one surah and another, the colour of the circle is different between one and another. This changes can be seen when the mouse is over the circle. Only two colour is provided to differentiate the circle, blue and green. This is because I do not want this system look so colourful and easy for user to view it.

## 6.4 System Development

System development is the process of creating programs that are needed to satisfy the requirements of the system. Hence, system development consists the used of methodology chosen, web pages coding and web-based development tools. The details are illustrated as below:

### 6.4.1 Methodology

This project is developed using the Spiral Model methodology. The development of this project will consist of four stages, which are requirement analysis, system design, implementation, and testing and evaluation (*as figure 6.1*). Rather than represent the development process as a sequence of activities with some backtracking from one activity to another, the process is represented as a spiral. The spiral life cycle model is also a variation of the classic waterfall model. Each of the development phases is carried out in one or more cycles, each cycle beginning with a risk assessment and including a prototype to provide insight into the risk issues. The basic premise of the model is that a certain sequence of steps is repeated while developing or maintaining system. The steps are first done at a high level of abstraction, and then each loop of the spiral represents a repeat of the steps at successively lower levels of abstraction.




Figures 6.1: Spiral Model

**Web Pages Coding**

a) **HTML Coding Examples**

Below is an example taken from the HTML text where we can embedded the Flash objects:

```
<html>
<body bottommargin="0" bgcolor="white" leftmargin="0"
background="graphic\bg_navigate1.gif" topmargin="0" rightmargin="0"><table width="100%"
border="0" align="center">
 <tr>
  <td colspan="3"><center>
<object classid="clsid:D27CDB6E-AE6D-11cf-96B8-444553540000"
 codebase="http://active.macromedia.com/flash2/cabs/swflash.cab#version=4,0,0,0"
 id="Banner" width="827" height="64">
 <param name="movie" value="Banner.swf">
 <param name="quality" value="high">
 <param name="bgcolor" value="#FFFFFF">
 <embed name="Banner" src="Banner.swf" quality="high" bgcolor="#FFFFFF"
  width="827" height="64"
  type="application/x-shockwave-flash"

pluginspage="http://www.macromedia.com/shockwave/download/index.cgi?P1_Prod_Versio
n=ShockwaveFlash">
 </embed>
</object>
</center></td>
 </tr>
 <tr>
  <td width="30%"> </td>
  <td width="53%"><table width="62%" height="2%" border="0" align="center"
background="graphic\menubar_bg.png">
    <tr>
     <td width="1" background="graphic\menubar_l.png"></td>
     <td width="36" class="style2"><a href="Movie1.html" class="style4">HOME</a></td>
     <td width="2" background="graphic\div.png"></td>
     <td width="80" class="style2 style3"><div align="center"><a
href="Makkiah.html"><strong>SURAH_MAKKIAH</strong></a></div></td>
     <td width="2" background="graphic\div.png"></td>
     <td width="40"><div align="left"><a href="Madaniyyah.html"
class="style1">SURAH_MADANIYYAH</a></div></td>
     <td width="1" background="graphic\menubar_l.png"></td>
    </tr>
  </table></td>
  <td width="30%"><div align="center"></div></td>
 </tr>
</table>
</body>
</html>
```

### 6.4.2 Web-Based Development Tools

SWiSH 2.0 is used as the main development tool for this project. This tool enables easy performance in the creation of a Web site, as well as the incorporation of HTML formatting and Layouts, graphics and other multimedia components. It is the best web application development tools that I had ever tried and used because it is very convenience and powerful. Macromedia Dreamweaver MX is also used to develop web application and suitable for web-based system. It is used to develop and edit the HTML pages where the Flash can be view on the Internet. Finally, all the circles are created using Adobe Photoshop.

### 6.4.3 Description of the System Modules and Functionalities

Basically Themescape Quranic Visualization can be categorized into 2 modules, which will be responsible for all the functionalities. The Table 6.2 below shows the description on each module and also its functionalities:

| Module | Functionalities |
|---|---|
| User Search | 1. User can search the required ayah by clicking on the circle on the screen that represent the surah which the ayah belong. |

| | |
|---|---|
| | 2. User can choose whether to view Makkiyah or Madaniah ayah.<br>3. User can zoom in and out of each ayah that they intend to view. |
| Visualization Interface | 1. Each surah in Al Quran will be presented using different color to differentiate the surah. |

Table 6.2: System Modules and Functionalities

## 6.5 Summary

This Chapter shows the details on the system implementation, which include: development environment, system development methodology, system development tools, and description of system modules & functionalities.

After a brief introduction for system implementation in section 6.1, the development environment and system implementation requirement was describe in section 6.2 where all the hardware and software requirement were listed out.



Then I have discuss about the system development approach at section 6.3, where I have also describe about the programming method I am using for developing this system, where I have attached some examples of coding for each programming languages I used in this project.

Lastly, in section 6.4, all the system functionalities for each module were summarize in the tables.

# CHAPTER 7

## 7.1 Introduction

Testing is a processed of verification and validation of a system. It is the major quality control measure during prototyping. When a system is coming in its way, it is always important for developer to conduct various tests on it. The reason testing are done is because it needs to be well presentable to the users. Testing of systems is supposed to be conducted at various stage of the development process. Testing not only mean to clear off bugs and coding error, but also to ensure the system is able to fulfill all the requirements specified. Therefore, through testing, a system is supposed to be not only bug free but also featuring all the requirements proposed.

## 7.2 Types of Testing

Testing can be classified into various categories. In the development of Themescape Quranic Visualization, tests conducted are according to the flow chart as of below:

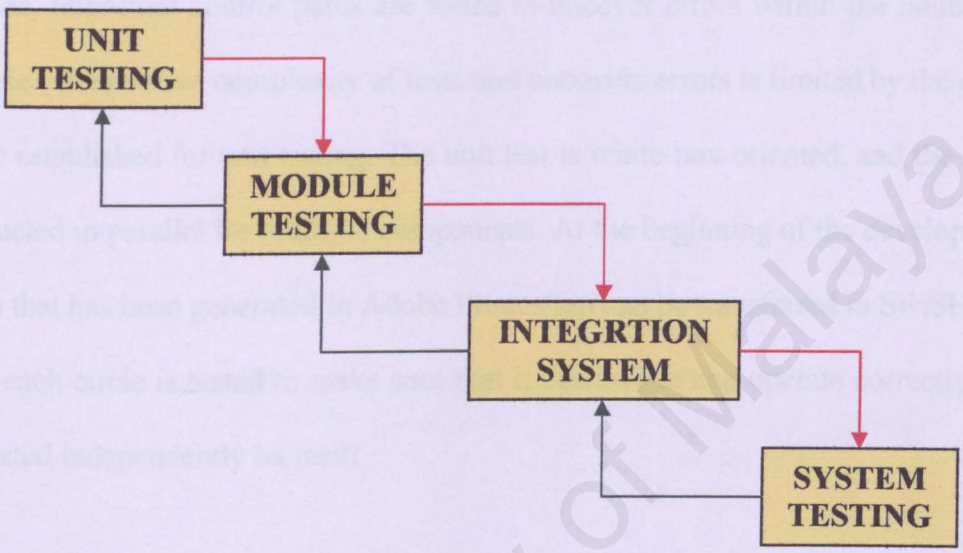



Figure 7.1 Testing Process

## 7.3 Unit Testing

Unit testing concentrates on the smallest unit of software design. Each component is treated as a stand-alone entity and tested individually to ensure that they operate correctly. Unit testing focuses on verification effort on the smallest unit of software design -software component or module. Using the component–level design description as a guide, important control paths are tested to uncover errors within the boundary of the module. The relative complexity of tests and uncovers errors is limited by the constrained scope established for unit testing. The unit test is white-box oriented, and the step can be conducted in parallel for multiple components. At the beginning of the development, each circle that has been generated in Adobe Photoshop can be transferred in SwiSH 2.0. From here, each circle is tested to make sure that it can be run and operate correctly. All these are tested independently on itself.

## 7.4 Module Testing

A module is a collection of components, which are interdependent. It is somehow a stage higher than the unit testing. It tests the combination of several units. The module by itself still cannot represent the while system but it offers one of the many features among those on Themescape Quranic Visualization. The following section discusses some of the modules testing in detail.

### 7.4.1 Example of Module Testing

The module testing involved will be shown as example:

**Module Test Case**

The User Search function in this system is used to search required surah and display the ayah. Module Testing was carried out to ensure that the ayah was being displayed successfully. Table below shows the test case for module testing on the function of displaying ayah.

| Test Procedure | Expected Output | Test Result Analyzing |
|---|---|---|
| Choose the required surah | Link to the page of displaying ayah. | Link to the page of display ayah is successful. |

Table 7.1: Module Test Case 1

User will choose the required surah that they want to view. When the surah has been selected and user clicked on the circle, it will be linked to another page that displays the ayah that they intended to view.

## 7.5 Integration Testing

When the integration testing is conducted, it involves test on numerous modules that had been integrated to formulate entire system. Usually modules that tested to be correct during the modules testing may not appear to be correct after it is integrated. This is because once integration is executed; modules may face variables or constant collision. Such collision will cause program to report errors once it is integrated. A good keynames for the HTML files are essential to avoid this program error.

## 7.6 System Testing

Integrated systems are integrated to obtain the entire system. System testing is concerned with finding errors, which result from unanticipated interaction between modules and system components. It is also concerned with ensuring that the system meets its functional and non-functional requirements. System testing verifies that elements are functioning properly, and the overall system performance and objectives are achieved. System testing itself can be divided into few more ports that are like:

**a) Performance Test**

Performance test is conducted to detect the runtime errors. Performance test not only test on the coding but it also test on the system's hardware performance and stability.

**b) Usability Test**

Usability test refers to the completeness of the system and it fulfillment towards the functionalities specified during the proposal of the system. This includes comparing the features provided within the system and the list of functionalities requirements produced.

## 7.7 System Evaluation

### 7.7.1 Introduction

System evaluation is considered as the last phase of system development life cycle. Much problems and errors were detected and corrected since the beginning of Themescape Quranic Visualization development. Throughout this chapter, all the problems face will be revealed and discussed. Evaluations and comments on the system will also be highlighted in order to identify the strengths and limitations. From here as well, the necessity for future enhancements will be discussed.

### 7.7.2 Problems and Solution

**a) Lack of Knowledge in Developing a System**

This problem is significantly proven as major as Themescape Quranic Visualization is developed all round as a web- based system. But before it is

developed in a web-based surrounding, it is formerly a stand-alone system. I have to admit that I am lack of knowledge in programming language, especially in C and C++. Besides, to generate visualization information using those programming language has made it more difficult. Therefore, in order to overcome it and equip myself with more knowledge on web development, there are a few options that I decided to do. First of all, I surfed through the Internet to expand my knowledge on web development. Expert forums and discussion were ransacked and dug to get more information towards developing an ideal web- based system. Besides that, I also browsed through the collection of books in the library to know more about this issue. Although I did not use any major programming language, suitable web programming languages were studied in detail to understand its strength and limitations as well as its level of contribute towards the future of Themescape Quranic Visualization. The next option that I sought is getting advice from the supervisor that has been very helpful towards the completion of the system.

**b) Working Out an Interesting User Interface**

As Themescape Quranic Visualization is just like a learning system, it is essential to create an user interface that will attracts users as well as building the curiosity feelings in them. Elements of the user interface must be interactive and responsive. This includes respond even when users roll the mouse over images, buttons, links et cetera. Besides that, the color management also requires ample of effort and concentration. Different colors will provide different kind of effect to the page. Users' mood of learning will drastically be affected if the wrong color is

picked. In order to created a great user interface for Themescape Quranic Visualization, I looked through major sites and analysis the elements used by them in their interface. Similarities are recorded and outstanding features found are also recorded. From these records, decisions on choices for user interface can be finalized.

**c) Time Constraint**

The development duration for Themescape Quranic Visualization is rather short. Besides that, the development period also comes together within a study semester. Therefore there is a need to juggle the time spent on each activity. A smart time management and planning is required to accommodate all these activities. Most of the time has been used to study about the programming language and web development. As lack of knowledge and experience were mentioned in one of the points above, time have to be spent to actually equip myself with this knowledge.

**d) Changes of Development Software**

In the process of completing the system, there were so many suggestions that have been introduced by the supervisor as the result of my lack of understanding and idea given by supervisor. For example, at first I was given a chance to choose my own programming language to develop the system. Therefore, I have choose Visual Basic. NET because in my first opinion, this programming language might be easy to learn and it's configuration is simple. But when I was stuck, the supervisor has given an idea where the Visual C++. NET might be suitable. And once again I had difficulties to learn it. And

so on the cycle of changing the development tools keep on happening. And at last, none of them have been implied in this system. To overcome this problem, I have change it from a stand-alone system to a web-based system. Therefore I have used web development tools such as Macromedia Dreamweaver and SWiSH 2.0.

### 7.7.3 Evaluation by End Users

In the process of completing the Themescape Quranic Visualization system, numerous users were invited to try out the system as well as conducting acceptance test on it. Users selected to be involved in this test are first year students from Faculty of Computer Science and Information Technology, University of Malaya. Comments and critics from these users were evaluated and reconsidered before the system is considered as complete. These comments are obtained after they have try out each and every part of the system. From the evaluations of the system users, it can be concluded that they are satisfied with the system and its functionalities.

### 7.7.4 System Strengths

Below are the strengths of Themescape Quranic Visualization: -

**a) Interactive Learning Experience for Users**

Users of Themescape Quranic Visualization will be offered with interactive learning experience throughout the usage of Themescape Quranic Visualization. They will be able to enjoy then fun and thrills of learning in a whole new style. As there is not yet any Quran visualization using themescape technique, this system will burn out their anxiety to learn Al-Quran.

**b) Availability to Every Corner of The World.**

As Themescape Quranic Visualization is a web- based system, it is always available to users from all over the world. All the users need to have is a personal computer and a connection to the Internet.

**c) Simple and User- Friendly Interfaces**

The interface of the system is simple and easy to use. The system provides an interesting and easy to navigate layout. Precise guidance such as tool tips are also given to guide the users to search for the required surah.

### 7.7.5 Future Enhancements

**a) Allows Addition Of New Lessons**

As part of the enhancement of the system, the successor of this system should be allowed to add in new functions easily. Currently the system only allows the viewing and displaying the ayah. In the future, it can be added with quizzes to test their knowledge of Al-Quran among user.

**b) Downloading for Offline Viewing**

In the future, the users should be allowed to download the files to their computer so that it can easily be shared and viewed at computers without Internet connection.

**c) Provide Software**

As for the time being, there is no software of creating themescape provided at the faculty. Therefore, in the near future the faculty should provide this software so that the developer can develop it much more quicker and easier.

### 7.7.6 Knowledge and Experienced gained

From the development of Themescape Quranic Visualization, the knowledge and experience gained are very invaluable. Knowledge and experience on web development as well as web programming was very much practiced throughout this duration of time. Besides that, problem solving and decision-making skills are also developed within

myself. Aside from the knowledge and skills mentioned above, independency was also developed from these few months of developing Themescape Quranic Visualization.

## 7.8 Conclusion

Chapter 7 documented the system's testing methods approached used. All the tests selected and conducted are recorded within this chapter. These entire tests are conducted accordingly to the sequence stated.

Testing is one of the important steps in developing a system. Precision and accuracy of output data is considered during this process. Unit, module, integration and system testing has been carried out for the Themescape Quranic Visualization system. These testing approaches lead to delivering a quality system to users. The objective of a system will only achieve after all the thorough testing done by different user with different aspects.

As been described above, Themescape Quranic Visualization has manage to accomplished the most of the specified system objectives and fulfilled all the requirements stated regardless of whether it is functional or non- functional. The knowledge garnered will be extremely useful for future usage on the career world. Time used to master languages like Visual C++.NET, HTML and more will not be a waste, as these languages are very highly demanded out there. The application of knowledge learnt from subjects taught throughout these 3 years in Bachelor of Computer Science is also contributed in the process of Themescape Quranic Visualization development. Themescape Quranic Visualization has been fully tested and is a reliable system. Each and every procedure selected including those for software engineering, concepts, principles, techniques are picked after thorough studies on it. Its suitability is analyzed

before it is decided to be used. All these experience gained will be especially useful in the future involvements of either software or web development.

# APPENDIX

**QUESTIONNAIRE FORM 2: GENERAL COMPUTING AND VISUALIZATION KNOWLEDGE**

**Instructions:** Tick 'x' or choose a number between 1-5 where applicable

**SECTION A: GENERAL COMPUTING**

1. Are you computer literate? (Proceed to question 2 if you tick 'yes')

   ☐ Yes ☐ No

2. Rate your computing efficiency (1=worse; 2=poor; 3=moderate; 4=good; 5=excellent)

   ☐

3. How many hours do you spend using computers weekly?

   ☐ Less than 1 hour

   ☐ 1-5 hours

   ☐ 6 – 10 hours

   ☐ 11 – 15 hours

   ☐ More than 15 hours

4. Where do you normally use the computers? (You can tick more than once)?

   ☐ Workplace

   ☐ Computer labs

   ☐ Cyber cafes

   ☐ Home

   ☐ Other (Please Specify)

5. Why do you use computers? (You can tick more than once)

- ☐ Work
- ☐ Research
- ☐ Leisure
- ☐ Other (Please specify)

**SECTION B: VISUALIZATION KNOWLEDGE**

6. Select your preference on how information should be presented on your computer screen:

- ☐ Text
- ☐ Graphics
- ☐ A combination of both text and graphics
- ☐ Unsure

7. Have you ever heard of the term 'visualization'? (If 'yes' please state where)

- ☐ Yes
- ☐ No

8. Are you familiar with visualization techniques?

- ☐ Yes
- ☐ No

9. Do you understand the need for visualization?

☐ Yes

☐ No

10. Can you name a visualization technique? (If yes please name one)

☐ Yes

☐ No

11. Would you like to learn more on visualization?

☐ Yes

☐ No

**SECTION C**

Questionnaire of Al Quran:

1. Are you Muslim?

☐ Yes ☐ No (If no, please proceed to section D)

2. How frequent you Al Quran?

☐ Everyday

☐ Twice a week

☐ Once a month

☐ Rarely

3. Have you use any Quranic software/application before?

☐ Yes ☐ No

5. Do you really understand the meaning of the content of Al Quran?

☐ Yes

☐ No

☐ Not Really

(If yes, please answer question 6, 7, 8, 9 and 10)

6. How many ayahs in Al Quran?

☐ Less than 5000 ayahs

☐ Between 5000 and 6000 ayahs

☐ More than 6000 ayahs

7. How many surahs in Al Quran?

☐ 110 surahs

☐ 112 surahs

☐ 114 surahs

8. What is the longest ayah in Al Quran?

- ☐ Al-Baqarah
- ☐ Al-Sajdah
- ☐ Al-Imran

9. What is the shortest ayah in Al Quran?

- ☐ Al-Fatihah
- ☐ Al-Kauthar
- ☐ Al-Ikhlas

10. Do you aware the difference of the number of ayah in each surah?

- ☐ Yes
- ☐ No
- ☐ Not Really

11. How do you find a particular ayah in Al Quran?

- ☐ Clarify which surah is the ayah belongs to
- ☐ Searching from one page to another page
- ☐ Do not know how to search
- ☐ Others (please specify) .....

12. How do you find a particular surah in Al Quran?

- ☐ Through the index of Al Quran
- ☐ Searching from one page to another page
- ☐ Do not know how to search
- ☐ Others (please specify) .....

**SECTION D**

Questionnaire of Makkiyah and Madaniah ayahs:

1. Do you know what are Makkiyah and Madaniah ayah in Al Quran?

   ☐ Yes ☐ No

2. Do you know the different between Makkiyah and Madaniah ayah?

   ☐ Yes

   ☐ No

   ☐ Not Really

3. Can you identify the characteristics of Makkiyah and Madaniah ayah?

   ☐ Yes

   ☐ No

   ☐ Not Really

4. Is it important to know the different between Makkiyah and Madaniah ayah?

   ☐ Yes ☐ No

## Table of Contents of Al-Quran

| Juzuk | Ayat No | Name of Surah | No of ayat | Ayat in respected surah | Percentage (%) |
|---|---|---|---|---|---|
| 1 | 1 | al-Fatihah | 7 | 1-7 | 3 |
| | 2 | al-Baqarah | 141 | 1-141 | 62 |
| 2 | 2 | | 111 | 142-252 | 49 |
| 3 | 2 | | 33 | 253-286 | 15 |
| | 3 | Ali 'Imran | 91 | 1-91 | 40 |
| 4 | 3 | | 109 | 92-200 | 48 |
| | 4 | al-Nisa' | 23 | 1-23 | 10 |
| 5 | 4 | | 124 | 24-147 | 55 |
| 6 | 4 | | 27 | 148-176 | 12 |
| | 5 | al-Maidah | 82 | 1-82 | 36 |
| 7 | 5 | | 38 | 83-120 | 17 |
| | 6 | al-An'aam | 110 | 1-110 | 48 |
| 8 | 6 | | 55 | 111-165 | 24 |
| | 7 | al-A'raf | 87 | 1-87 | 38 |
| 9 | 7 | | 83 | 88-206 | 37 |
| | 8 | al-Anfaal | 40 | 1-40 | 18 |
| 10 | 8 | | 35 | 41-75 | 15 |
| | 9 | al-Taubah | 93 | 1-93 | 41 |
| 11 | 9 | | 36 | 94-129 | 16 |
| | 10 | Yunus | 109 | 1-109 | 48 |
| | 11 | Hud | 5 | 1-5 | 2 |
| 12 | 11 | | 118 | 6-123 | 52 |
| | 12 | Yusuf | 52 | 1-52 | 23 |
| 13 | 12 | | 59 | 53-111 | 26 |
| | 13 | al-Ra'd | 43 | 1-43 | 19 |
| | 14 | Ibrahim | 52 | 1-52 | 23 |
| 14 | 15 | al-Hijr | 99 | 1-99 | 44 |
| | 16 | al-Nahl | 128 | 1-128 | 56 |
| 15 | 17 | al-Isra' | 111 | 1-111 | 49 |
| | 18 | al-Kahfi | 110 | 1-74 | 48 |
| 16 | 18 | | 36 | 75-110 | 16 |
| | 19 | Maryam | 98 | 1-98 | 43 |
| | 20 | Taha | 135 | 1-135 | 59 |
| 17 | 21 | al-Anbiya' | 112 | 1-112 | 49 |
| | 22 | al-Hajj | 78 | 1-78 | 34 |
| 18 | 23 | al-Mu'minun | 118 | 1-118 | 52 |
| | 24 | al-Nur | 64 | 1-64 | 28 |
| | 25 | al-Furqan | 20 | 1-20 | 9 |
| 19 | 25 | | 57 | 21-77 | 25 |
| | 26 | al-Syuaara' | 227 | 1-227 | **100** |
| | 27 | al-Naml | 59 | 1-59 | 26 |
| 20 | 28 | | 34 | 60-93 | 15 |
| | 28 | al-Qasas | 88 | 1-88 | 39 |
| | 29 | al-'Ankabut | 44 | 1-44 | 19 |
| 21 | 29 | | 25 | 45-69 | 11 |
| | 30 | al-Ruum | 60 | 1-60 | 26 |
| | 31 | Luqmaan | 34 | 1-34 | 15 |

| | | | | | |
|---|---|---|---|---|---|
| 21 | 32 | al-Sajdah | 30 | 1-30 | 13 |
| | 33 | al-Ahzaab | 73 | 1-30 | 32 |
| 22 | 33 | | 43 | 31-73 | 19 |
| | 34 | Saba' | 54 | 1-54 | 24 |
| | 35 | al-Fathir | 45 | 1-45 | 20 |
| | 36 | Yaasin | 22 | 1-22 | 10 |
| 23 | 36 | | 61 | 23-83 | 27 |
| | 37 | al-Saffaat | 182 | 1-183 | 80 |
| | 38 | al-Sad | 88 | 1-88 | 39 |
| | 39 | al-Zumar | 31 | 1-31 | 14 |
| 24 | 39 | | 44 | 32-75 | 19 |
| | 40 | Ghafir | 85 | 1-85 | 37 |
| | 41 | Fussilat | 46 | 1-46 | 20 |
| 25 | 41 | | 8 | 47-54 | 4 |
| | 42 | al-Syura | 53 | 1-53 | 23 |
| | 43 | al-Zukhruf | 89 | 1-89 | 39 |
| | 44 | al-Dukhan | 59 | 1-59 | 26 |
| | 45 | al-Jathiya | 37 | 1-37 | 16 |
| 26 | 46 | al-Ahqaf | 35 | 1-35 | 15 |
| | 47 | Muhammad | 38 | 1-38 | 17 |
| | 48 | al-Fath | 29 | 1-29 | 13 |
| | 49 | al-Hujuraat | 18 | 1-18 | 8 |
| | 50 | Qaaf | 45 | 1-45 | 20 |
| | 51 | al-Zariyat | 18 | 1-18 | 8 |
| 27 | 51 | | 42 | 19-60 | 19 |
| | 52 | al-Tuur | 49 | 1-49 | 22 |
| | 53 | al-Najm | 62 | 1-62 | 27 |
| | 54 | al-Qamar | 55 | 1-55 | 24 |
| | 55 | al-Rahman | 78 | 1-78 | 24 |
| | 56 | al-Waqi'ah | 96 | 1-96 | 42 |
| | 57 | al-Hadid | 29 | 1-29 | 13 |
| 28 | 58 | al-Mujadalah | 22 | 1-22 | 10 |
| | 59 | al-Hasyr | 24 | 1-24 | 11 |
| | 60 | al-Mumtahinah | 13 | 1-13 | 6 |
| | 61 | al-Saff | 14 | 1-14 | 6 |
| | 62 | al-Jumu'ah | 11 | 1-11 | 5 |
| | 63 | al-Munafiquun | 11 | 1-11 | 5 |
| | 64 | al-Taghabun | 18 | 1-18 | 8 |
| 28 | 65 | al-Talaq | 12 | 1-12 | 5 |
| | 66 | al-Tahrim | 12 | 1-12 | 5 |
| 29 | 67 | al-Mulk | 30 | 1-30 | 13 |
| | 68 | al-Qalam | 52 | 1-52 | 23 |
| | 69 | al-Haaqqah | 52 | 1-52 | 23 |
| | 70 | al-Ma'aarij | 44 | 1-44 | 19 |
| | 71 | Nuh | 28 | 1-28 | 12 |
| | 72 | al-Jinn | 28 | 1-28 | 12 |
| | 73 | al-Muzammil | 20 | 1-20 | 9 |
| | 74 | al-Muddaththir | 56 | 1-56 | 25 |
| | 75 | al-Qiyamah | 40 | 1-40 | 18 |
| | 76 | al-Insan | 31 | 1-31 | 14 |

| | | | | | |
|---|---|---|---|---|---|
| | 77 | al-Mursalaat | 50 | 1-50 | 22 |
| 30 | 78 | al-Naba' | 40 | 1-40 | 18 |
| | 79 | al-Naazi'at | 46 | 1-46 | 20 |
| | 80 | Abasa | 42 | 1-42 | 19 |
| | 81 | al-Takwir | 29 | 1-29 | 13 |
| | 82 | al-Infitar | 19 | 1-19 | 8 |
| | 83 | al-Mutaffifin | 36 | 1-36 | 16 |
| | 84 | al-Insyiqaq | 25 | 1-25 | 11 |
| | 85 | al-Buruj | 22 | 1-22 | 10 |
| | 86 | al-Tariq | 17 | 1-17 | 7 |
| | 87 | al-A'la | 19 | 1-19 | 8 |
| | 88 | al-Ghashiyah | 26 | 1-26 | 11 |
| | 89 | al-Fajr | 30 | 1-30 | 13 |
| | 90 | al-Balad | 20 | 1-20 | 9 |
| | 91 | al-Syams | 15 | 1-15 | 7 |
| | 92 | al-Lail | 21 | 1-21 | 9 |
| | 93 | al-Dhuha | 11 | 1-11 | 5 |
| | 94 | al-Syarh | 8 | 1-8 | 4 |
| | 95 | al-Tiin | 8 | 1-8 | 4 |
| | 96 | al-'Alaq | 19 | 1-19 | 8 |
| | 97 | al-Qadr | 5 | 1-5 | 2 |
| | 98 | al-Bayyinah | 8 | 1-8 | 4 |
| | 99 | al-Zalzalah | 8 | 1-8 | 4 |
| | 100 | al-A'adiyat | 11 | 1-11 | 5 |
| 30 | 101 | al-Qari'ah | 11 | 1-11 | 5 |
| | 102 | al-Takathur | 8 | 1-8 | 4 |
| | 103 | al-'Asr | 3 | 1-3 | 1 |
| | 104 | al-Humazah | 9 | 1-9 | 4 |
| | 105 | al-Fiil | 5 | 1-5 | 2 |
| | 106 | Quraisy | 4 | 1-4 | 2 |
| | 107 | al-Ma'uun | 7 | 1-7 | 3 |
| | 108 | al-Kauthar | 3 | 1-3 | 1 |
| | 109 | Al-Kaafirun | 6 | 1-6 | 3 |
| | 110 | Al-Nasr | 3 | 1-3 | 1 |
| | 111 | al-Masad | 5 | 1-5 | 2 |
| | 112 | al-Ihklas | 4 | 1-4 | 2 |
| | 113 | al-Falaq | 5 | 1-5 | 2 |
| | 114 | al-Nas | 6 | 1-6 | 3 |

# USER MANUAL

1. Intro page

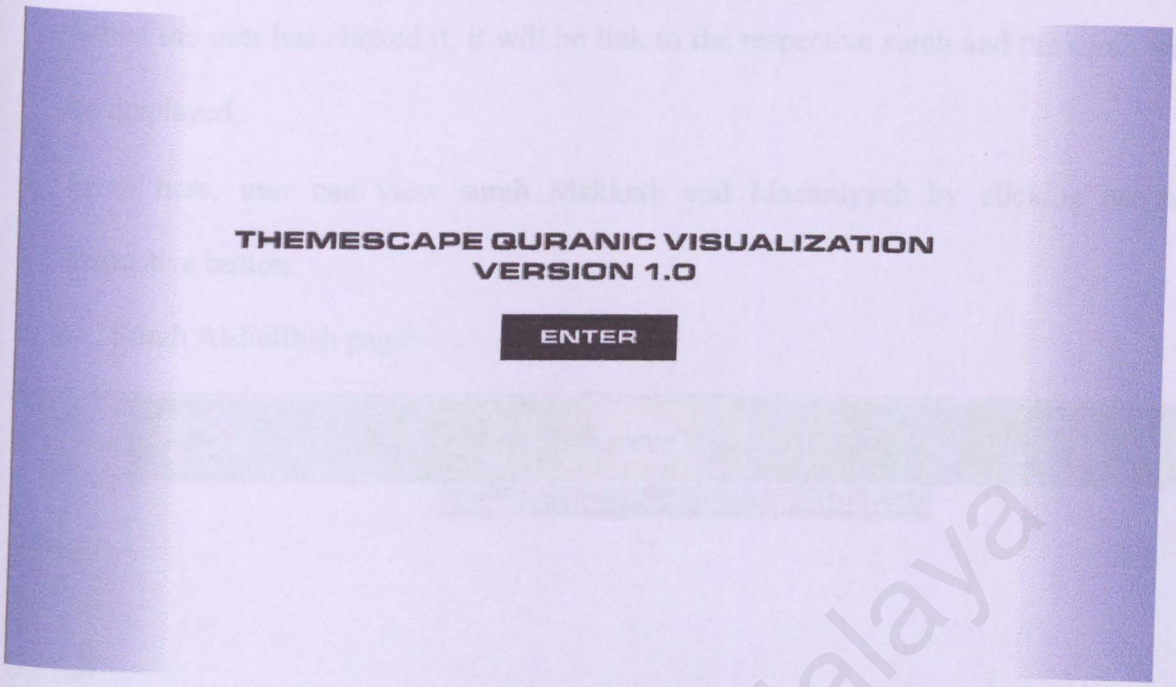



Figure A: Intro page

- User click on "ENTER" button to go to main page

2. Main page of Themescape Quranic Visualization

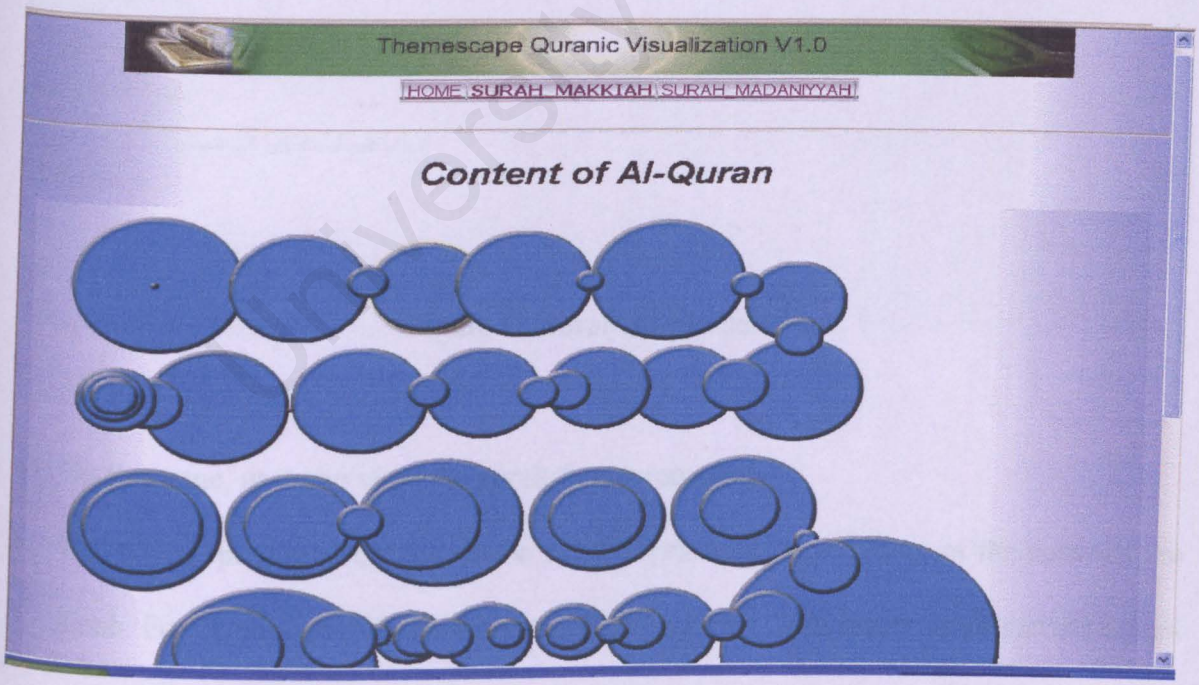



Figure B: Main page

- On the main page, user can click on any circle that represents the surah in Al-Quran. When the user has clicked it, it will be link to the respective surah and the surah will be displayed.
- From here, user can view surah Makkiah and Madaniyyah by clicking on the respective button.

3. Surah Al-Fatihah page:

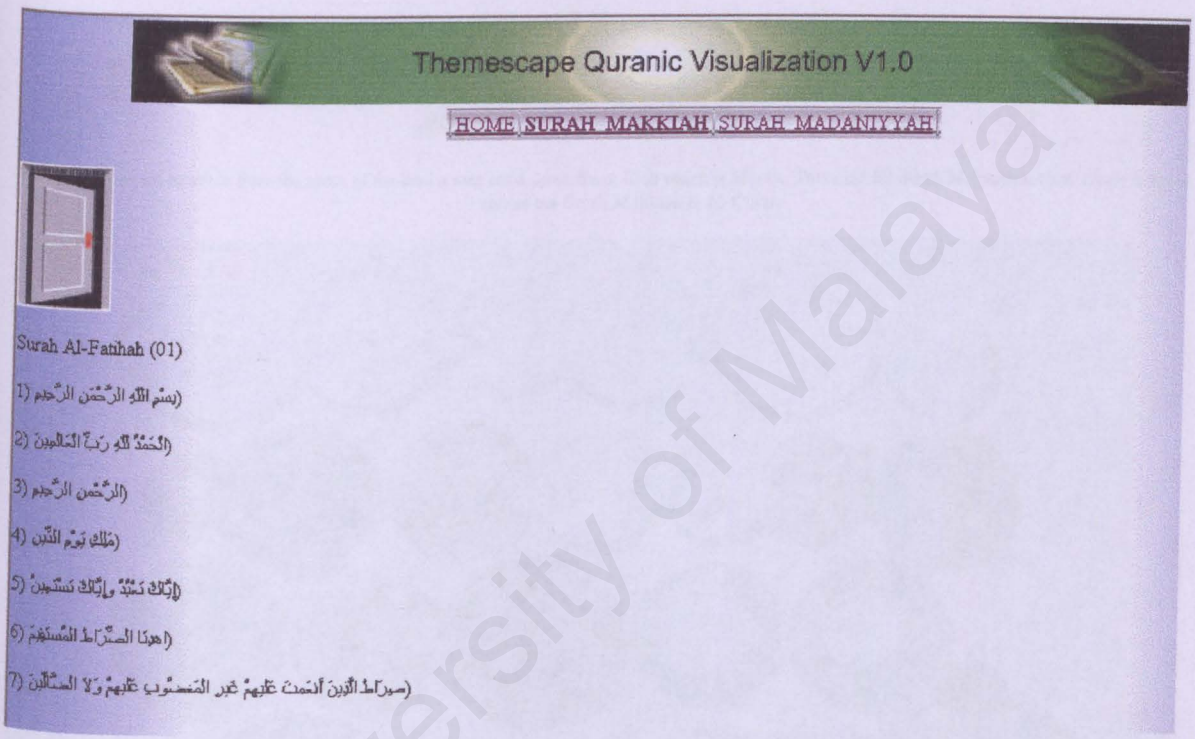



Figure C: Surah Al-Fatihah Page

- On this page, user can view the surah that is required.
- The "door" picture at the top of the surah represents the meaning of the name of the surah. For example, Al-Fatihah means "The Opening". Therefore, door picture is best to represent the meaning.

- From this page, user can click the button provided at the top to go back to the respective page.

3. Surah-Surah Makkiah and Madaniyyah:

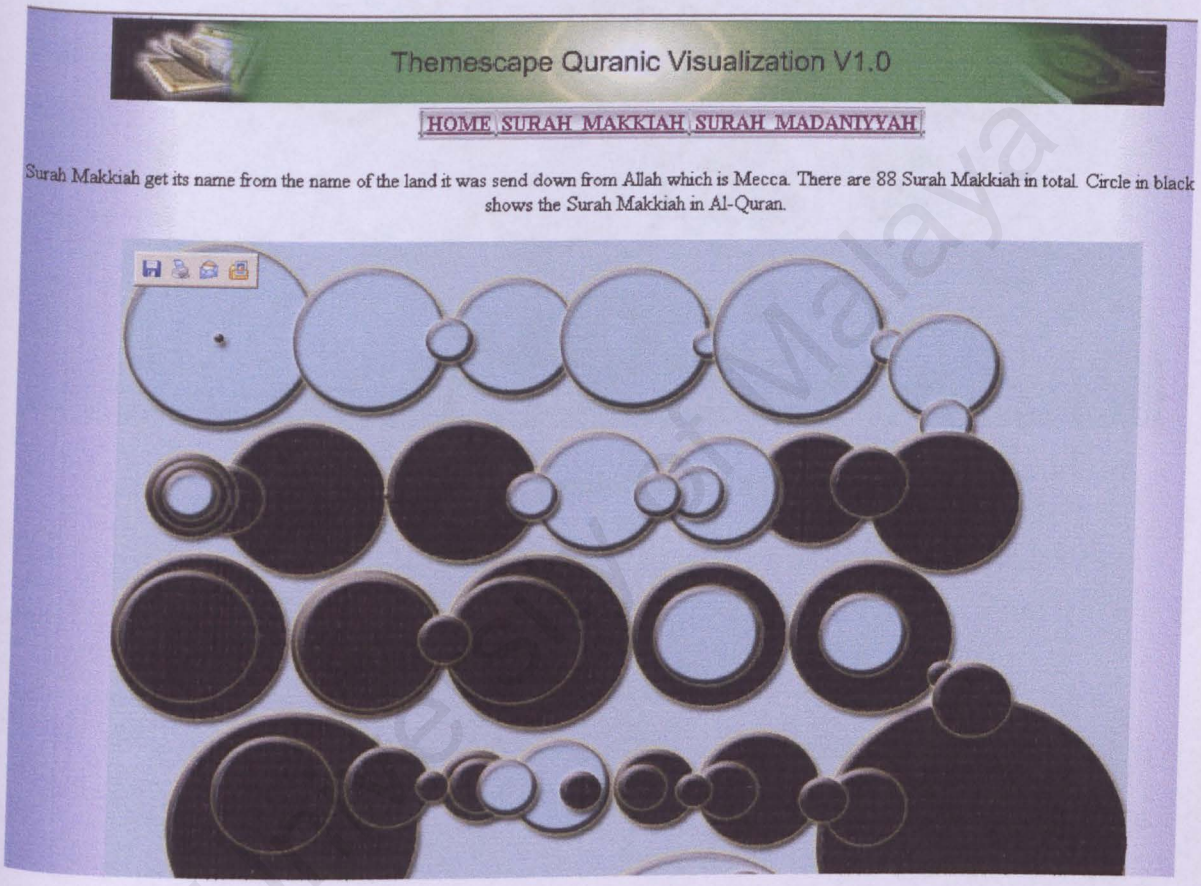



Figure D: Surah-Surah Makkiah

- In Surah Makkiah and Surah Madaniyyah page (Figure D and E), user can view all the Surah Makkiah and Surah Madaniyyah on Al-Quran. User can click on respective button to go to the respective page.

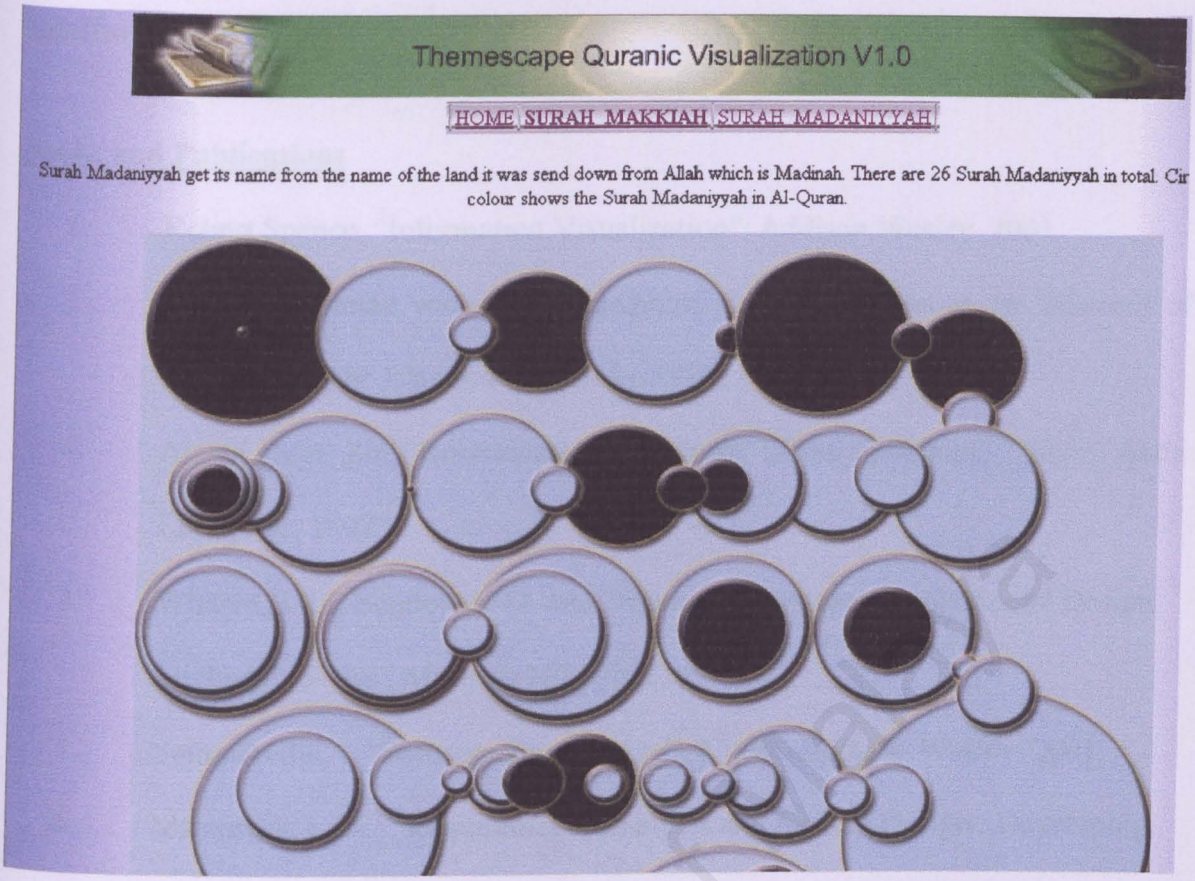



Figure E: Surah-Surah Madaniyyah

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**Internet Resources**


11. http://www.arabtop.net

12. http://www.ekabakti.com

13. http://www.divineislam.com

14. http://www.boutell.com